Review
of
Mineral Production in India
for
1896 & 1897

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BOMBAY BRANCH
OF THE
ROYAL ASIATIC SOCIETY.
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GOVERNMENT OF INDIA.

DEPARTMENT OF REVENUE AND AGRICULTURE.

REVIEW

MINERAL PRODUCTION IN INDIA

FOR

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1896

GEORGE WATT, M.B., C.M., C.I.E.,
REPORTER ON ECONOMIC PRODUCTS TO THE GOVERNMENT OF INDIA.

Published by order of the Governor General in Council.

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Statement I.

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THE MORE IMPORTANT MINERALS.

1.—SALT (*Namak, Hind.*)

SALT:

I.—PRODUCTION OF SALT IN INDIA.

PRODUCTION.

[*Correspondence File No. 196.*]

The information tabulated on page 66 will be found to manifest a decrease in this year's production of salt, which amounts to 11·77 per cent. on the outturn of the previous year. A comparison of the present returns, with the average of the past three years, shows still further the production to manifest a decline of 6·62 per cent. The obvious explanation of these facts is that the manufacture of salt from the lakes and estuaries of India is dependent to a large extent on the favourableness or otherwise of the season. In good years a far larger amount is made than is actually required, and the surplus is stored against a season when it might not be possible to manufacture sufficient to meet actual consumption. The production last year came to 1,026,744 tons against 1,163,813 tons in 1895.

II.—SOURCES OF SUPPLY, METHODS OF MANUFACTURE, AND PRICE OF PRODUCTION.

1. There are four chief sources of salt supply: (*a*) Evaporation salt from the lakes and pits of Rajputana; (*b*) Evaporation salt obtained directly or indirectly from the sea; (*c*) Rock salt of the Panjab; and (*d*) Foreign salt imported into India. The table, para. 34, gives the total production for the past five years.

The administration of the Salt Revenue may be said to be vested in five offices as follows:—(1) the Commissioner of Salt Revenue, Northern India; (2) the Board of Revenue, Bengal; (3) the Collector of Salt Revenue, Bombay; (4) the Collector of Salt Revenue, Sind; and (5) the Board of Revenue, Madras. It may serve a useful purpose to give very briefly an account of the sources of supply in relation to the administrative organisation.

2. ***NORTHERN INDIA.***—The EVAPORATION salt of Rajputana is derived from the Sambhar lake, the Didwana lake, and the Pachbadra pits.

NORTHERN INDIA:

The ***SAMBHAR*** lake is by far the most important. It is situated on the borders of the Jaipur and Jodhpur States. It is a shallow sheet of water which measures 20 miles in length and averages from 2 to 7 miles in breadth, but contains when full only some one to four feet of water. The salt obtained is of very high quality and is consumed throughout the North-West Provinces and Oudh, Rajputana and Central India. The working season ordinarily is from November to May, but it varies greatly according to the character and extent of the previous rains. It is this circumstance mainly that accounts for the extreme fluctuations shown in the returns of production. The lake is leased by Government from the Jaipur and Jodhpur States for ₹7,00,000 with, in addition, a royalty of 40 per cent. of the price of salt sold in excess of 63,135 tons. The royalty may be said to add, on an average, the further payment of ₹2,00,000 a year.

Sambhar.

Three descriptions of salt are made at Sambhar, *viz.*, (*a*) *Kyar* salt produced in permanently walled compartments within the lake; (*b*) pan salt made in shallow basins constructed along the shores of the lake; and (*c*) lake salt, that is, salt that forms spontaneously in the bed of the lake as the water evaporates, and without any assistance except light screens run out to retain the brine within selected areas, in other words to prevent its receding into the distant central basin.

(*a*) The object of the formation of permanent walls (*kyars*) is to allow of manufacture at times when extraction by other processes would be impossible, owing to there being either too much or too little brine. There are ten *kyars* in operation, sub-divided into pans about two feet in depth by a pathway running between. The supply of brine is regulated as desired. Soft earth is carefully removed from the pans, in order that the deposit of salt may be as clean as possible. The salt produced is accordingly of excellent quality and is formed into large crystals. In good years the produce of *kyar* salt amounts to over 36,600 tons.

(*b*) The pan salt, produced on the shore of the lake, is superior to that formed naturally but inferior to *kyar* salt. It is small in grain and the crystals are badly formed. The pans are constructed of the clay of the soil and they last for only one season. They are scattered along the shore for a distance of 20 miles, and as the water of the lake recedes fresh pans have to be made further and further in. They are fed by trenches from the deeper water. The brine is raised from the trenches or reservoirs by hand pumps or by baskets lined with leather. These are swung by two men who stand on either side of the trench and hold the ropes attached to the baskets. The brine is scooped out as it were and thrown to the higher level. In a fair average season the quantity of salt, made in this way, comes to about 91,500 tons.

SALT: PRODUCTION.

NORTHERN INDIA. Sambhar.

(*c*) The naturally formed salt amounts to about 36,600 tons. The highest record of total production at Sambhar was in 1883-84 when 260,276 tons were turned out, and the lowest 1892-93, *viz.*, 3,318 tons. The former was an abnormally favourable and the latter an abnormally unfavourable year. The average during the past ten years has been 149,033 tons. In 1892-93 the rainfall came to 41 inches, or about 15 inches over the highest record. The prevailing wind was also easterly and damp. Crop after crop of salt as it formed was again destroyed by the showers that fell throughout the year. The liability, therefore, to fluctuations such as indicated necessitates large storage. In favourable years no opportunity is lost to advance production. When the year 1883-84 opened, there was a balance of salt in store at Sambhar of 166,358 tons. The manufactures of that year came to 260,276 tons and the sales were 134,738 tons. When 1892-93 closed, the year of lowest recorded production, the sales had been 187,011 tons, but the surplus stock even then came to 10,326 tons. These figures illustrate the balance usually preserved by storage on fluctuations of production. The table, para. 34, gives the total production during the past five years, and it will be seen the amount produced compares unfavourably with the two previous years or with the decennial average.

The actual cost of production and storage is usually about 6 pies per maund, but on adding the cost of establishment and supervision, rent of the source, royalty on sales and all other petty charges, it comes to 3 annas and 8·46 pies a maund. The average price obtained for the salt sold at the source may be put at 4 annas and 0·11 pies per maund. Owing to the high price of food labour was last year abundant and cost of production low, *viz.*, 3·91 pies a maund.

Didwana.

3. The ***DIDWANA SALT*** is derived from a small lake about three miles long and one mile broad. It belongs to the Jodhpur State, but is leased by the Government of India for ₹2,00,000. The working season extends from February to the commencement of the rains. The average production at Didwana during the past four years has been 14,035 tons. The average cost of actual production and storage comes to 5·34 pies per maund, but if to this be added supervision, rent and all other charges, the net cost of production comes to 2 annas 9·32 pies per maund.

Pachbadra.

4. The ***PACHBADRA.***—This source of supply has been leased by Government from the Jodhpur State for ₹1,70,000 a year. The salt is procured from pits dug within what might be described as a former river bed. The area over which the works extend is about six by two and a half miles. The salt is known by the names of the three working sections, *viz.*, Sambra, Hiragarh and Pusali. Sambra salt is of the best quality and forms into larger crystals than the salt of the other two sections. The pits are sunk in clay soil, those in Hiragarh and Pusali being in more sandy soils. There is practically no working season at Pachbadra, salt may be obtained any time, except during heavy rains or sand storms. The average annual production during the past four years has been 30,453 tons. The cost of production comes usually to 3 annas 3·91 pies a maund, but it fluctuates greatly in relation to the conditions of Sambhar production.

Rock Salt.

5. The ***ROCK SALT*** of Northern India is excavated from, 1st, the salt mines of the Salt Range which extend for 152 miles from the Jhelam to the Indus; 2nd, the salt mines of Kohat (trans-Indus); and, 3rd, the Himalayan salt mines of the Mandi State. The first may be spoken of as the salt mines of the Panjab. They consist of the Mayo mines in the Jhelam district; the Warcha mines in the Shahpur district; and the Kalabagh mines of the Bannu district.

Mayo Mines.

The ***Mayo Mines*** are said to have five workable salt seams, with an aggregate thickness of fully 275 feet and between these marl and unworkable salt to the extent of *other* 275 feet. The mines open into the Khewra gorge and are entered by a tunnel along which a tramway is laid. Operations are carried from the roof downwards passing through the strata. The salt is obtained by pick and blast in the usual way with all mining operations. The chambers thus excavated are separated by walls of salt 25 to 30 feet in thickness. Some of these chambers measure 250 feet long by 45 feet wide and 200 feet in height. It has been stated, in a criticism on the wisdom of treating salt, "technically a mineral," as such, that "a salt merchant may be called a dealer in minerals, but a gold miner would repudiate the idea, and a diamond merchant would utterly scout it." The salt mining operations of the Panjab compare not unfavourably even from an engineering point of view, with either the gold or the coal mining of other provinces. They give employment to about 700 miners. The supply is inexhaustible and is liable to little or no interruptions. The output is entirely dependent on demand. Since the opening of the Sind-Sagar State Railway and the bridging of the Jhelam at Chok Nizam the trade with the North-West Provinces has been greatly expanded, and yearly increasing supplies are being sent even to Patna and Gya in Behar, thus to a certain extent penetrating into the area formerly exclusively held by European salt. The salt obtained from these mines is of a very pure quality, as much as 97 to 98 per cent. being sodium chloride. The average production during the past seven years has been 74,847 tons, but the output first exceeded that average in 1889-90 and has never materially fallen below it, so that it may be regarded that distinct indications of an increasing demand have been established. The table, para. 34, gives the actual production of rock salt during the past five years. Mayo mines salt landed at the depôt may be said to be produced at 8 pies per maund, or, say, R1-3 per ton. The cost of excavation in these mines is 10½ pies a cubic foot or ₹4-0-9·78 per 100 maunds.

Warcha Mines.

6. The ***Warcha Mines*** are similar, though on a smaller scale, to the Mayo, and the ***Kalabagh, Kohat,*** and ***Mandi*** would more correctly be described as quarries than mines. The quantity of salt at Kohat is absolutely inexhaustible. At Bahadur Kheyl, for example, the all but naked salt is four miles long and

averages a quarter of a mile wide with some of the visible salt strata over 1,000 feet in thickness. It has been estimated that the Kohat salt comes to over 150 millions of tons.

Brine-Wells. Sultanpur.

7. *SULTANPUR.*—Lastly in the Panjab, over a tract of country of some 15 square miles in extent, that lies south-west of Delhi, salt is obtained from brine wells. This is known as Sultanpur salt from the name of the chief village. It is, however, of very inferior quality though of good colour, is small grained and bitter to taste, owing to the presence of sodium sulphate. It cannot compete with Sambhar salt, being badly and expensively worked over and above its inferior quality. The cost of production, exclusive of interest on borrowed capital, comes to about 2½ annas per maund. The manufactured salt during the past four years has maintained an average of 3,620 tons. The season of production is from October to June. In this connection it may be mentioned that 815 tons of salt, valued at ₹49,124, were manufactured at Sunkaransar, about 50 miles north of Bikanir. It is only used by the poorer classes and given to cattle and other animals. It is also used for curing hides.

8. *KASHMIR.*—In response to a request for more detailed information on the general subject of minerals of Kashmir the Resident has kindly furnished a note, written by Captain J. L. Kaye, Settlement Commissioner, on the subject of salt:—

I take the following extracts on the subject of salt in Kashmir from Mr. Lawrence's book "The Valley of Kashmir":—

"Page 63. No salt is found in the Valley, but certain salt-licks exist to which the stags resort in the spring."

"Page 254. Salt is an important article of diet, both for men and for cattle and sheep. The Kashmiris like their food very salty. There are two kinds. The better comes from the Panjab, but salt of an inferior quality is brought from Ladakh."

"Page 393. Salt is of great importance, and the imports have risen rapidly since 1888-89. A certain amount of earth salt is still imported from Ladakh as food for cattle (*Note.*—The average quantity of salt annually imported from Ladakh is about 812 maunds valued at ₹2,233), but the figures given in the table (Panjab Trade Reports, Kashmir trade imports from 1886-92) refer to Panjab salt. Taking the population of the Kashmir State as 2,515,678, including Ladakh, and taking the average quantity of salt imported as 1,68,265 maunds, the amount of salt available for each person is somewhat over 5 lbs. per annum, but it must be remembered that from the 1,68,265 maunds cattle and sheep have to be fed. In India, where the consumption of salt is by no means lavish, the general average of consumption is 10 lbs. per head of population, so that it is obvious that the Kashmiris do not obtain a sufficiency. As salt is a necessity, both for men and cattle, it is to be hoped that the State will use every endeavour to encourage the salt trade, and the two methods by which encouragement can be given are the improvement of communications and the reduction or abolition of the heavy duty on salt."

"From the above extracts it will be seen that Mr. Lawrence based his figures on the Panjab Trade Returns, and not on local investigations. The enquiries made by Mr. Rivett, the Governor of Kashmir, and myself in no way support the results obtained by Mr. Lawrence's calculations."

No Scarcity.

"The information collected by the independent enquiries mentioned is, however, so very conflicting in its details that this note cannot be considered satisfactory or correct; but the statements made by the people and the officials point to no scarcity of salt or serve to bear out the opinion that the duty levied by the State checks the salt trade to an extent which causes hardships to the inhabitants of the valley. The duty levied by the Durbar is supposed to be ₹1-5-3 per maund of Panjabi salt. I write *supposed*, because the rate of duty fluctuates for the reasons given below. The Durbar farms out the collection of the import taxation to a contractor."

Duty on Panjab salt.

Salt for animals.

"The Kashmiri fully appreciates the necessity of salt for man and beast, and I have been told that he attaches such importance to giving salt to his animals that if there is any scarcity of salt, he will go without it himself rather than let his cattle, etc., want for it.

Price of Panjab salt.

"The average selling price of Panjabi salt is stated to be 7 seers (Kashmiri) to the rupee (Imperial), but I should be inclined to believe that this rate is too low. The lowest rate I have heard of is 8 seers (K) to the rupee, and in the winter months, when the snow is on the ground, the rate is much higher. In the winter of 1891-92 it is said that for a time salt sold at 2½ seers (K) to the rupee. I should take the average rate per rupee (Imperial) as 6½ seers (K). From the above it follows that Ladakhi salt is nearly half the price of Panjabi salt, and for this reason in the old days Ladakhi salt used to be supplied to the Army. This custom has, however, been discontinued.

Salt from Ladakh.

"Salt from Ladakh is still imported, but in very small quantities, and may be said to be no longer in general use. Mr. Lawrence, as noted, estimates the annual imports of Ladakhi salt at 812 maunds. The Customs officials state that about 650 Kharwars = 1,404 maunds (Imperial) are annually imported, while my enquiries show that 1,200 maunds are annually brought into the valley. The import duty on Ladakhi salt is annas 3-6 per Kharwar or, roughly, anna 1-8 per maund (Imperial), and the average selling rate is 12 seers (Kashmiri) to the rupee (Imperial).

"The Ladakhi salt is an earth salt, and is considered unhealthy both for men and cattle. In man its use is said to cause deafness and puffiness of the skin, in cattle stomach and liver diseases. In both man and cattle it is said to cause itch.

SALT: PRODUCTION.

Use of Ladakhi salt.

"North of Kangan, on the Leh road, Ladakhi salt is said to be generally used. The cash price seems to be the same as in the valley, one *trak* being sold for one rupee (*kham*), *i.e.*, 6 seers (K) for annas 8 (Imperial), but as a rule it is used in barter, and according to the market 2, 2½ to 3 *bundha* (or as much as can be held in the two hands placed together) of grain are exchanged for one *bandha* of salt. Ladakhi salt is still used to a certain extent by Halwais. They place the salt in a bowl of water, the sand sinks and the salt is dissolved in the water. Food cooked in the water, which is drained off, thus obtains a salt flavour. With this exception it may be said that Ladakhi salt is not eaten by man in the valley of Kashmir and the amount imported is given to cattle."

BENGAL.

9. ***BENGAL.***—There is practically no salt manufacture in Bengal, the small quantity produced in Orissa being under the administration of the Madras Salt Department. (*Conf. with paras. 15 and 24.*)

Foreign Salt.

FOREIGN SALT.—The first recorded imports of foreign salt were in 1818-19, but the quantity remained small until 1835-36. The amount imported in 1852-53 was only 104,445 tons. The old stocks of salt manufactured at the Government agencies were exhausted in 1873-74, since which date the consumption over the whole of Bengal has been entirely met, or practically so, by foreign salt. Bengal salt supply at the present day is imported by Calcutta and Chittagong. The other ports that show imports of salt (Chandbali and Narainganj) deal with coastwise traffic from Calcutta or Chittagong.

The following statement may be given as fully expressing the Bengal traffic in salt. Local (Bengal) production is a very small factor and the supplies obtained from Bombay and Madras (paras. 24, 38) are insignificant when compared with the foreign imports :—

Analysis of the Bengal Supply and Consumption of Salt.

Years.	Total Supply, Foreign and Indian. I.	Foreign Imports * (including Aden). II.	Total Consumption, Foreign and Indian. III.
	Tons.	Tons.	Tons.
1870-71 . . .	259,549	217,668	287,964
1875-76 . . .	366,905	330,861	289,684
1880-81 . . .	347,122	304,904	318,322
1885-86 . . .	344,094	314,285	363,815
1890-91 . . .	359,570	337,526	359,503
1891-92 . . .	331,606	319,469	368,433
1892-93 . . .	345,889	325,191	372,258
1893-94 . . .	379,802	365,174	367,012
1894-95 . . .	478,527	459,523	378,379
1895-96 . . .	384,867	355,078	381,186

* The Total Foreign Imports into India (for 1890-91 to 1895-96) will be found under para. 36 as also the chief countries of supply. Practically the whole goes to Bengal (except about 50,000 tons to Burma) and the United Kingdom is by far the most important country of supply.

In some respects it may be said foreign salt does not at present compete with Indian production. It simply has possession of Bengal and Burma, while Indian salt similarly holds the other markets. Railway freight is the governing factor, Calcutta being remote from the seats of production. India possesses in the Salt Range alone enough salt to meet the demands of the whole world, but the sea freights from Europe are less than the railway charges from the mines or from the salt-yielding lakes and estuaries.

The quantity of salt imported to a very large extent is dependent on the freights ruling; if high, a decrease of imports occurs, the reverse being the case when a dearth prevails in other cargoes. Salt is brought to India by many "liners," especially those sailing from Liverpool, and by special vessels chartered for the jute trade which carry out salt practically as ballast. "Tramps" also occasionally bring coal to Port Said and then come on to India with salt from Ras Rowaya and Aden. Under para. 36 other particulars of the total imports of all India of foreign salt will be found. The present remarks refer to the supply drawn by Bengal. And it may be added by way of concluding this section that the opening of the East Coast Railway may be expected to bring Calcutta into comparatively easy touch with an important area of sea-salt production which is capable of considerable expansion. The future may thus be looked to as possibly likely to show direct competition of Indian with foreign salt.

Aden.

The various classes of salt commonly imported into Calcutta may be grouped as follows :—

Description.

Manufactured by solar evaporation : Bombay, Madras, Ceylon, Jeddah, Muscat, Aden, Italy and [France.

Manufactured by boiling : Liverpool and Hamburg.

Rock Salt : Muscat.

10. ***BOMBAY.***—The salt consumed in the Western Presidency may be said to be of three kinds: (*a*) Baragara salt; (*b*) Sea-salt; and (*c*) Imported salt.

BOMBAY: Baragara.

(*a*) ***BARAGARA SALT.***—This is manufactured from sub-soil brine at two centres six miles apart, namely, Kharaghora and Udu on the borders of the Lesser Runn of Cutch. The land belongs to Government, and the salt is manufactured on Government account by men who are paid a fixed rate for salt that comes up to standard. This form of salt occurs in large cubical crystals from half to three quarters of an inch in diameter, each of which is built up of a number of smaller crystals. It is extremely hard and can be sent to great distances with remarkably little loss. The average quantity produced within the past five years has been 79,974 tons.

Sea-Salt.

11. (*b*) ***SEA-SALT.***—With the exception of four small groups of works, all the sea-salt works in the Presidency are located within a radius of 30 miles around the city of Bombay and mainly in the Thana district. Practically all these works are owned by private individuals. Even the Government works are farmed out to persons who manufacture the salt on exactly the same conditions as the owners of private concerns. It may consequently be said that in Bombay the manufacture of salt is entirely a private industry conducted under license. (*Conf. with paras. 16, 26 and 35.*) The salt made is the property of the licensee, the price being fixed in the open market. There are no restrictions of any kind. The functions of the Salt Department are the safe custody of the salt produced (none can be removed except under permit) and the collection of duty on salt when removed.

The site chosen for a salt-works is usually on the shore of a creek or estuary, below the level of high tides and fully exposed to the influence of the prevailing winds. It is first surrounded by high embankments, the enclosed space being perhaps 250 by 80 feet. The space so enclosed is then divided by other walls into three sections—the outer reservoir, the inner reservoir, and the pan area. The space devoted to pans, is carefully levelled and a floor of clay repeatedly puddled until it becomes water-tight. The pans are formed by small clay partitions two feet broad which run the whole length and breadth of the pan area crossing each other at right angles and thus forming a number of rectangular crystallising beds. The size of the beds vary, but 18 to 10 feet are common. The levels are so arranged that the water flows from the first reservoir into the second and from the second into the pans, being gradually concentrated as it flows from one basin to another. The water from the sea is admitted through a sluice and is thus exposed to evaporation till it forms brine. With this brine the pans are charged, to a depth of an inch and a half, and within a few hours in favourable weather, especially on shallow pans, a layer of crystals is formed, generally about one quarter of an inch in thickness. The salt is then racked on to the ridges and left to dry, and the pans are re-charged.

Bombay sea-salt is composed of small crystals about one-eighth of an inch in diameter, but fine grain salt (the siftings and sweepings of the pans) is exported to Calcutta and the drift or flake salt—an excellent quality and whiteness—is reserved for the Bombay market. The season of production is from March to June. It varies, however, very greatly with the weather—cloudy sky and a low temperature during the hot weather, retard evaporation and diminish the outturn. Unseasonable rain may stop manufacture entirely. The outturn depends in fact more on the date when the rains set in than on anything else. If the rains are late, the crop is a large one. In well-conducted works the cost of production is 6 pies per maund, the average is probably 9 pies. The table, para. 34, gives the total production of salt in Bombay during the past five years.

Imported.

12. (*c*) ***IMPORTED SALT.***—This to a very small extent consists of European table salt. The manufacture of sea-salt in Bombay and Madras demonstrates what India can do in competition with foreign imports. The case of Calcutta is doubtless different in many respects from that of Bombay, its distance from the sea being an important factor in the existence of a large import trade in foreign salt. The chief imports into Bombay are coastwise and by road. During the past four years the total imports (Foreign and Indian) have been in 1892-93 8,635 tons, in 1893-94 9,303 tons, in 1894-95 11,413 tons and in 1895-96 12,064 tons. Since the termination of the Goa treaty large quantities of salt have been drawn from that State to meet the necessities of the Southern Maratha country and part of Madras Presidency. This salt is sea-salt of good quality, closely resembling Bombay salt. Sind and the Persian Gulf ports also furnish Bombay with a quota of its salt.

SIND: Maurypur.

13. ***SIND*** has three main sources of supply, *viz.*, (*a*) Maurypur, (*b*) Saran, and (*c*) Dilyar.

(*a*) ***MAURYPUR*** works are similar to those near Bombay. The salt is manufactured from sea water. This supplies the greater part of Sind, a very considerable portion being issued from the depôt at Sukkur. The works are situate on the Moach plain, about seven miles west of Karachi. The water is let into the works by a channel leading from the harbour. Salt is manufactured all the year round, except when it rains.

At Sirganda, on the Kori mouth of the Indus (adjoining the Runn of Cutch), vast deposits of salt exist, but these are not worked.

Saran and Dilyar.

14. (*b*) and (*c*) the ***SARAN*** and ***DILYAR*** salt deposits are lakes from which the salt is obtained on the evaporation of the water by a process exactly similar to that in Rajputana. This salt is sold to the people of Thar and Parkar and the Hyderabad districts. Operations are generally conducted during the cold weather, when the water is at its lowest level.

SALT: PRODUCTION. SIND.

The total production of Sind usually averages **10,000 tons** (*see para. 34*). The cost of production and storage of salt in Sind has been put at 15 pies per maund at Maurypur, and 9 pies at Saran and Dilyar.

MADRAS:

15. ***MADRAS.***—Salt is obtained in this Presidency exclusively by evaporation in salt-works known locally as factories. The factories of the west coast have for some years been abandoned, as neither the soil nor the climate were favourable for salt manufacture. On the east coast there are about 80 factories which cover an area of 13,800 acres. Spontaneous salt is also collected at a few localities, such as Panchakali in the Tinnevelly district, Vedaraniyam in Tanjore, and Pandraka in Kistna. Pandraka salt is heavy and pure. It is not used in the presidency, but is exported to the Nizam's Dominions. The manufacture of earth salt and salt from saltpetre has since the Act of 1882 been almost entirely abandoned. From 1802 down to 1883 the private manufacture of salt was prohibited, but since about 1886 private manufacture has greatly increased. This is permitted under an excise system, Government in many cases having leased their factories to private parties. (*Conf. with paras. 11 and 24.*)

The system pursued in making salt from sea water is very similar to that briefly indicated above in connection with Bombay and Sind. The sea water is allowed to flow into great shallow basins where evaporation takes place, the brine being at the same time made to flow from successive basins until it reaches the final evaporating pans. There are two modifications, however, of the pans, one in which each flow is allowed to evaporate and is then scraped out; the other in which successive flows of brine are evaporated, one on the top of the other, until the pans are practically full of layer upon layer of salt.

The season of production varies in the different factories according to the period of rainfall. In the four most northern districts with a strong south-west monsoon, manufacture rarely extends into July. In Nellore, owing to the rains of June and July being only slight, manufacture is continued up to August and sometimes even September. In the Chingleput, South Arcot and Tanjore districts, manufacture usually closes in September, while in Madura and Tinnevelly it continues to October and even November. The season of commencement of operations similarly varies according to the period of heaviest rainfall and amount of the rains. In the northern districts salt even begins to form in November, to the south not till December or even not before March. There has recently been a slightly increased production in Orissa, on the part of Government. The salt is made in pans by sun-drying at two factories, *viz.*, Gurubai and Tua on the Chilka lake. The total cost of production at the Government factories in Orissa has been put at 3 annas a maund. (*Conf. with para. 9.*) The average annual production at the east coast factories for the past five years has been 321,676 tons, but the demand for this salt has given indications of a uniform and steady improvement. The average production for the five years ending 1886-87 came to only 224,600 tons. The actual production for the past five years will be seen in the table, *para. 34*. The reader will find the Salt Administration Report of Madras for the year 1895-96, especially Chapters IV, V, VII, XII and XIII, to give full particulars on the production and supply of salt.

16. In an official publication (*System and Practice of Salt Administration in India*, freely consulted in the preparation of this review) it is pointed out that "Under the excise system, Government has no control over the extent of the manufacture. The interest of the licensees, and of the middlemen into whose hands they have fallen, are opposed to the maintenance of large stocks, as there is less loss from wastage if stocks can be disposed of without loss of time. It is no part of their business to provide against scarcity of salt and they therefore manufacture only as much salt as may suit their interest, and no more." The success or failure of salt manufacture is, however, chiefly dependent on the state of the seasons: if rains are untimely or heavy, manufacturing operations must of necessity be poor, while a continuous dry season is favourable for salt manufacture."

In 1881-82 the net cost of salt came to 2 annas 4·3 pies a maund, but in subsequent years the cost of the Government salt under the monopoly system rarely exceeded 2 annas. As regards excise (the report above quoted states that) "it is difficult owing to the want of particulars to say what the cost is. In most factories it must in recent years have been considerably under 2 annas a maund. In introducing the excise system it was expected that a diminution in cost would be effected by competition amongst the manufacturers, but the tendency has everywhere been towards "*combination* rather than *competition.*" Of late, however, notwithstanding the handsome remuneration paid by capitalists, there has been a gradual increase in the number of independent licensees, who show a growing tendency to free themselves from the control of capitalists." (*Private Enterprise—Conf. with paras. 11, 26, 30 and 35.*)

BURMA:

17. ***BURMA.***—To the above statement of the salt supply of India may be added very briefly some particulars as to Burma. Throughout both Upper and Lower Burma salt is manufactured from brine impregnated earth and at Amherst from sea water; in the former of these processes the brine is boiled down in kerosene oil tins, in earthen pots or in bowl-shaped iron cauldrons of from 2 to 12 gallons capacity. The rate of taxation is regulated in direct relationship to the duty on foreign imported salt. The amounts manufactured by private persons holding licenses were during the past four years as follows:—13,234 tons in 1892-93; 17,516 tons in 1893-94; 19,345 in 1894-95; and 17,365 tons in 1895-96. The relative importance, however, of this industry to that in imported foreign salt may be shown by the following figures of the imports in 1892-93 (foreign 34,665 + coastwise 2,052) 36,717 tons; in 1893-94 (foreign 47,492 + coastwise 1,651) 49,143 tons; in 1894-95 (foreign 48,442 + coastwise 2,717) 51,159 tons; and in 1895-96 (foreign 51,852 + coastwise 5,041) 56,893 tons. It will be observed that the local production during the past year decreased so that the returns show, on those of 1894-95, 10·23 per cent. decrease, or on the average of the three preceding years an increase of 3·99 per cent.

III.—AREAS OF CONSUMPTION.

The particulars dealt with in the foregoing remarks may be accepted as denoting the chief seats of supply or production. It may now serve a useful purpose to denote the markets or areas within which the various classes of salt are distributed. In dealing with this section opportunity will be taken to exhibit certain details of the returns of trade for the year under review.

NORTHERN INDIA SALT: Sambhar.

18. *NORTHERN INDIA SALT.—SAMBHAR SALT* is more extensively used than any other over the greater part of the North-West Provinces, Oudh and Rajputana. It also penetrates into the south-eastern districts of the Panjab (bordering Rajputana); into Central India, and into a portion of the Central Provinces. In the north and north-west it meets in the cis-Indus districts of the Panjab, the Rock Salt of that area and in the direction of Bengal, it overlaps the region of the imported foreign salt of the Lower Provinces. Towards the south of Rajputana and south and south-east of Central India it comes into conflict with Pachbadra salt and with the Barágara salt of Bombay. Similarly in the Central Provinces it is found to be gradually contesting the markets with Pachbadra, Barágara, and Konkan salt.

Owing to the heavy sales of Sambhar salt in 1890-91, 1891-92, followed by the bad manufacturing season but continued high demands of 1892-93, the reserve stocks were overdrawn. To check this the price of Sambhar salt had to be raised and the demand in 1893-94 (as was intended it should) naturally declined. But the year 1893-94 proved a remarkably good manufacturing one and hence relative to 1892-93 the production manifested an almost unprecedented expansion. Sambhar salt was, however, temporarily displaced from portions of its natural area by Didwana, Pachbadra, and even by Barágara. The last-mentioned, fostered by the high prices demanded for Sambhar salt, found its way to a much greater extent than ordinarily into the districts of the North-West Provinces The rock salt of the Panjab manifested little, if any, benefit by the opening afforded through the high prices that ruled for Sambhar salt. This illustration only serves, therefore, to demonstrate the mutual adjustments that at once take place should the necessary production in any one of the important centres be prevented.

Pachbadra.

19. *PACHBADRA SALT.*—The area over which this salt formerly penetrated was very much greater than at present. It has been restricted through the greater facility of producing cheap salt at Sambhar. Its present markets may be said to be Udaipur, Bhopal, and Sagar.

Didwana.

20. *DIDWANA* in normal years supplies Rohtak, Hissar, Delhi and the Karnal districts of the Panjab and Mozaffernagar, Saharanpur, Meerut and Balandshahr of the North-West Provinces.

21. THE *ROCK SALT* of the Panjab practically supplies the whole cis-Indus districts of that province north of the area of Didwana salt, and extends into Kashmir on the one side, Bahawalpur on the other. Throughout Kangra and Simla and portions of the adjacent districts Mandi salt is almost exclusively used. To the west, the Indus forms a sharply dividing line, Kohat salt meeting all the demands of the trans-Indus tract.

The following particulars regarding the consumption of salt in Kashmir have been furnished by Captain J. L. Kaye, Settlement Commissioner, Jummu and Kashmir :—

Consumption of Panjab salt.

"The following figures, showing the consumption of salt in Kashmir, refer only to Panjabi salt.

Annual average consumption per head of the population in Kashmiri seers :—

* In the city of Srinagar	$4\frac{1}{3}$ to 9
† In four Tahsils	4 to 7

The annual average consumption per head of livestock in Kashmiri seers :—

* * Pony	1 to $2\frac{1}{3}$
Cow and bullock	$\frac{3}{4}$ to $2\frac{1}{3}$
† † Buffalo	3
‡ Sheep and goat	1

If Ladakhi salt is used, about $\frac{1}{3}$ more is given than the quantities stated above.

NOTES.— * In the city it is stated by some that the average consumption per diem is 1 tola per head, others think that as an average 2 tolas is nearer the mark.

† Most cultivators whom I have questioned believe that the average consumption is fully 7 seers per head per annum.

NOTES.—* * Salt is given to horses, cows, and bullocks four times in the year.

† † Blocks of salt are placed before the buffalo to lick once in every 7 or 10 days.

‡ Salt is given to sheep and goats twice, while on the ilak (grazing ground on the mountains) during the four summer months and three times during the remainder of the year.

"That the calculation of the average annual consumption of salt at 7 seers (K) per head of the population is more or less correct is, I think, borne out by the old custom under which a Shakdar, *i.e.*, the man employed by the State, Mustajir (farmer of a village) or Jagirdar to watch the crops in a village to prevent the villager taking more than their shares of the crop, used to receive a daily allowance of $\frac{1}{2}$ *pal* = 2 tolas of salt. This seems to show that this was considered the quantity necessary for the man's daily consumption. A calculation based on a rate of $\frac{1}{2}$ *pal* of salt per diem per head of the population gives a total of 9 seers per head per annum. This amount is far in excess of the average amount annually consumed per head in India, given

SALT: CONSUMPTION

by Mr. Lawrence as 10 lbs., and is accounted for by the Kashmiris on the grounds that the practice of the inhabitants of the valley of eating vegetables with every meal requires the consumption of a larger quantity of salt than the food generally eaten in India.

PANJAB. Total annual consumption of Panjab salt.

"Taking the annual consumption of salt per head of the population at 6 seers Kashmiri = 5⅝ seers Imperial, which figure my enquiries lead me to believe may be safely adopted, and taking the population of the valley according to the census of 1891 at 814,241 persons (I take the figures from Mr. Lawrence's book) the annual amount of salt consumed by human beings in Kashmir would be represented by 109,922 maunds. I have not yet received the details of live stock to enable me to calculate the total consumption of salt on the basis of my estimated annual consumption by each man and beast in Kashmir."

Traffic in Northern India salt.

22. ***Traffic in the Salt of Northern India.***—The following statement shows the production of salt during the past five years in the chief centres of this area :—

Northern India Production of Salt.

	1892.	1893.	1894.	1895.	1896.
	Tons.	Tons.	Tons.	Tons.	Tons.
Sambhar	42,716	70,992	277,974	196,727	99,378
Other Rajputana Salt	21,818	11,821	61,377	51,997	35,680
Rock Salt	91,944	97,091	96,837	96,471	105,447
TOTAL	156,478	179,904	436,188	345,195	240,505

The above return purposely leaves out of account Mandi salt, Sultanpuri salt and the small amount of salt obtained as a by-product in the purification of saltpetre.

NORTHERN INDIA:

The statement of Rail-borne Traffic (Appendix, *pages 72-75*) will be seen to exhibit the movements of salt of all kinds within India. From what has been already stated it may readily be admitted that the exports from Rajputana and the Panjab can with safety be accepted as drawn from the sources indicated above. During the year under review, Rajputana exported in all 120,110 tons of salt. The major portion of this went to the North-West Provinces (*viz.*, 87·39 per cent.) and very much smaller quantities to the Panjab and the Central Provinces. The Panjab exported only 15,173 tons, the bulk of which also went to the North-West Provinces with considerable quantities to Bengal and the Central Provinces.

The balance over these returns of exports of the figures of production may, for all practical purposes, be regarded as representing local consumption and surplus stock.

BENGAL: Foreign Salt.

23. ***BENGAL.***—As already indicated, the whole of Bengal proper, including Behar and rather more than half of Cuttack, are supplied by imported, mostly foreign, salt (*Conf. para. 9*). This meets the Chilka lake salt and the sea salt of Ganjam in Orissa, the rock-salt of the Panjab in Behar, and, passing across the geographical limits of Bengal, it also contests the markets of Sambhar salt in the frontier districts of the North-West Provinces. It penetrates into Nepal, Sikkim, Bhutan, and after supplying the wants of all the districts of Assam it overflows into the hill tracts on the north-eastern frontier. From Chittagong it is carried to the Lushai country and even across the frontier into the adjacent mountain tracts of Burma.

Traffic in salt.

24. ***Bengal Traffic in Salt.***—To obtain some conception of the Bengal traffic in salt it is necessary to tabulate the quotations of imports and exports by sea and land. The returns of the Rail and River-borne Trade show an export (*page 13 also 73*) during the past year, of 316,198 tons from Calcutta, the major portion of which (88·25 per cent.) went to the Bengal Province. The exports from the Province are unimportant and may be disregarded. Last year they came to only 4,873 tons consigned to Assam, the North-West Provinces, Central Provinces and Calcutta. Assam draws its chief supply from Calcutta, and last year this came to 20,527 tons. The North-West Provinces took 16,603 tons from Calcutta, and a very much smaller quantity went even to the Panjab. The imports into Calcutta by rail were 1,567 tons and the Province drew, as has been already stated, 2,876 tons from the Panjab, chiefly, no doubt, rock-salt.

The bulk of the Bengal supply is of course derived from foreign countries. The returns given above (*page 4*) show a remarkable expansion in this traffic from 104,445 tons in 1852-53 to 355,073 tons in 1895-96. Last year, however, experienced a decline of 22·73 per cent. on the imports of 1894-95. But to obtain a full conception of the Bengal salt trade it is necessary to add to the figure just mentioned the quantities of Indian salt imported coastwise and the small local production of Orissa and Behar. From the table given (*page 12*) of the coastwise transactions in salt, it will be seen that the traffic has been on the whole steadily improving, although it declined slightly last year due no doubt to the abnormally large foreign imports of 1894-95. The figures of the coastwise imports into Bengal were in 1891-92, 24,195 tons; in 1892-93, 23,707 tons; in 1893-94, 21,149 tons; in 1894-95, 27,358 tons and in 1895-96, 15,071 tons. Statement No. I (*page 66*) shows the manufacture to have been 7,663 tons in 1895 and 8,507 in 1896. This consists of the salt of Orissa and the salt from the saltpetre refineries of Behar. From 1892-93 Government took over the manufacture of salt on the Chilka lake, and not being in full operation in that year the output was but small (2,460 tons). It may be accepted that Orissa and Behar together during each of the past five years have not contributed more than 8,000 tons to the Bengal supply. But it may be added that, while an

Orissa Salt.

expansion of the Orissa production may be looked for, that of Behar may be expected to decline. The statement (*page 10*) gives the returns of Orissa salt during the past five years.

BOMBAY. Baragara.

25. ***BOMBAY.***—The area over which Bombay salt penetrates is greater than that of any other salt met with in India. The BARÁGARA salt permeates the whole of the northern tracts of the Presidency (including Kathiawar) as far south as Baroda. It extends into Rajputana, Central India and Malwa, contesting the markets of Pachbadra and Sambhar salt. It is still more largely distributed into the Central Provinces and even to the North-West Provinces (as for example in Hathras, Fyzabad and Benares). About 31 per cent. of the production is normally consumed in the Bombay Presidency, 27 per cent. in the Central Provinces, 20 per cent. in the North-West Provinces and 21 per cent. in Rajputana and Central India.

Sea Salt.

26. But the BOMBAY ***SEA-SALT*** has a far wider and more important area of distribution than the Barágara. It holds the whole country south of Baroda throughout the province and to the far south in the Nizam's Dominions and Mysore, with large quantities even conveyed to Travancore and Cochin. It penetrates the Madras Presidency as far as Bezwáda and is exported by coasting vessels to Calcutta. It is diffused through the Central Provinces and Berar, often side by side with Barágara salt, until it is met on the one hand by the small quantities of imported salt that find their way into the Central Provinces and Chutia Nagpur, and on the other by the Sambhar salt in the North-West Provinces. About 36 per cent. of the sea-salt manufactured is consumed within the Presidency; 16 per cent. goes to the Central Provinces; 10 per cent. to the Nizam's Dominions; 20 per cent. to British Malabar; 7 per cent. to Cochin and Travancore; and about 8 per cent. to Calcutta.

27. It has been stated that "the success of Bombay sea-salt in competition with other salts in the markets outside the Presidency is due to the enterprise of the Bombay traders, and the skill of the manufacturers in producing salt to suit the markets which they supply. For instance, much attention has been paid to the production of light salt; and as it is sold at the works and duty levied by weight but retailed in the districts above the ghâts by measure, this gives the Bombay traders an advantage over those dealing in heavy salt. This is one of the principal reasons why Bombay salt is carried so far into the Madras Presidency in the face of the competition of the Madras salt." (*Conf. with para. 30 below.*)

SIND.

28. ***SIND.***—Practically all the salt manufactured is locally consumed. A small import in rock-salt from the Panjab takes place, and possibly a certain quantity of earth salt is carried across the frontier from the neighbouring Native States that surround the Province.

Traffic in Bombay and Sind Salts.

29. ***Traffic in the Salt of Bombay and Sind.***—Statement No. I (*page 66*) shows the production of last year to have been **351,366 tons**, a figure that manifests a decrease on the previous year's production of 16·22 per cent., and on the average of the three previous years of 10·32 per cent. It may be useful to record here the production during the past five years, *viz.*, in 1892, 330,741 tons; in 1893, 317,804 tons; in 1894 438,229 tons; in 1895, 419,417 tons and in 1896, **351,366 tons.** The rail-borne returns (*pages 12-13 and 72-73*) of all forms of salt from Bombay (Port Town and Province) show the exports to have been **121,221 tons** from the province and **16,124 tons** from the port town. Of the former amount the Central Provinces took 51,793 tons, the Nizam's Dominions 19,837 tons, the North-West Provinces 15,169 tons, Rajputana and Central India 13,769 tons, Berar 14,599 tons and Mysore 3,468 tons. Of the latter the (port town) exports by rail went mainly to Mysore, with smaller quantities to Madras and the Bombay Presidency. The Sind exports by rail were purely nominal (87 tons), but Karachi exported last year 7,545, nearly the whole of which went to the province. The coastwise transactions will be seen from the table below (*page 12*), but it may be here remarked that Bombay furnishes fully three times as much as it imports. Further, its imports last year, *viz.*, 46,830 tons, came from other ports in the Presidency to the port town of Bombay. Of the **147,500 tons** exported by all Indian Ports, Bombay town gave 140,599 tons. Of that amount Madras took 49,053 tons, Bengal 16,054 tons, Travancore 13,701 tons, Goa 9,334 tons and other ports in the Bombay Presidency 46,289. Practically it may be said that after leaving out of account the interchanges between Bombay port town with other ports within the Presidency, the coastwise exports in Indian salt are from Bombay port town to Madras, Bengal and Travancore. The consignments to Goa are more than compensated for by the rail-borne exports from Goa to the Maratha Country.

MADRAS.

30. ***MADRAS.***—Excluding the two west coast districts (that consume imported salt) it may be said that the remaining districts of the Presidency are mainly supplied with locally manufactured SEA-SALT. The exports from the province are from Ganjam to Orissa and from Godávari and Kistna into the Nizam's Dominions. In fact, a large amount of the salt used in Mysore and the Nizam's Diminions and even a considerable proportion of that taken by the Central Provinces is derived from the Madras factories. The exports by sea are chiefly to Calcutta and occasionally also to the Straits Settlements. The Calcutta traffic is said to be unpopular because of the necessity to send the salt in sealed bags. The imports are mainly from Bombay, the lighter salt of that province "notwithstanding its inferior quality" having ousted the Madras salt from Malabar, South Canara, Mysore and even Coimbatore and Salem.

Traffic in Madras Salt.

31. ***Traffic in the Salt of Madras.***—Statement No. I (*page 66*) shows the production of salt in this province to have been **347,545 tons** during the year under review. That production represents an increase of 6·31 per cent. on the figure of 1395 and of 13·01 on the average for the past three years. From what has been stated, however, it will be understood fluctuations in the returns of evaporation salt cannot be regarded as prognostications of any decline in the trade. They may be due to bad manufacturing seasons or to large accumulated reserve stocks. This idea is fully borne out by the returns of production for the past five years, *viz.*, 338,287 tons in 1892; 269,138 tons in 1893; 326,501 tons in 1894; 326,905 tons in 1895, and 347,545 tons in 1896.

SALT: CONSUMPTION. TRADE. The rail-borne trade of Madras Presidency shows an export of 7,716 tons, or nearly double the exports of 1894 (*see pages 12 and 73*). Practically the whole of these exports went to the Nizam's Dominions and to Mysore. The port towns of Madras, however, exported by rail a very much larger quantity, namely, 82,486 tons, which was distributed all over the Presidency with small quantities consigned to the Nizam's Dominions and Mysore. The coastwise traffic has already been indicated under Bombay. It is chiefly the growing demand for the light salt of the Western Presidency. The exports were 3,444 tons—a figure that will be observed to be not very stationary from year to year (*page 12*) and these exports are largely to Calcutta.

ASSAM. 32. *ASSAM.*—The Director of Land Records and Agriculture furnishes the following information concerning the importation of rock-salt from the tribes inhabiting the hills to the north of the Assam Valley:

"The only interesting peculiarity of the salt trade of the Province of which I am aware is the import of rock-salt across the land frontier of Assam which I do not find mentioned in the 'Review on the Mineral Production of India' for 1895. The salt in question is imported into this Province by the Bhutias of Bhutan and Towang, and also by the Abors, Mishmis and other tribes inhabiting the hills to the north of the Assam Valley. It is valued at ₹4 to ₹5 a maund, and is bartered with the inhabitants of the submontane villages for rice. It is usually consumed by the villagers who trade with the Bhutias and is not re-exported from the Province. The statement below shows the quantity and value of the rock-salt imported into Assam in the year 1896-97:—"

	Quantity. Maunds.	Value. ₹
From Bhutan	77	398
From Dowang	532	2,426
From Abor, Mishmi, etc., Hills	97	394
TOTAL (=26 tons.)	706	3,218

The rail ande river-borne traffic between Bengal and Assam will be seen by the tables, pages 13 and 73. The total imports last year came to 23,597 tons.

IV.—IMPERIAL TRAFFIC.

SALT: TRADE. IMPERIAL: 33. By way of concluding this review of the features of last year's Production and Consumption of Salt, it may be as well to furnish certain statistical information that is best exhibited for the provinces of India collectively.

Production. *34. PRODUCTION OF SALT IN INDIA.*—The following table may be given of the chief items of production, classified more or less on the plan of the foregoing remarks. The totals differ from those of Statement No. I (*page 66*) mainly through the exclusion from this analysis of the salt made in Aden and that in the Native States of Cutch and Kathiawar:—

	1892.	1893.	1894.	1895.	1896.
NORTHERN INDIA.	Tons.	Tons.	Tons.	Tons.	Tons.
Sambhar	42,716	70,992	277,934	196,727	99,378
Other Rajputana salts	21,818	11,821	61,377	51,997	35,680
Panjab and Kohat mines	91,944	97,091	96,837	96,471	105,447
Mandi, Sultanpur, Gwalior and the Saltpetre refineries of Bengal and North-Western Provinces and Oudh and the Panjab	12,543	9,845	10,381	12,307	12,774
BOMBAY.					
Sea-salt and Barágara	319,570	308,613	430,059	408,553	341,948
SIND	11,171	9,191	8,170	10,864	9,419
MADRAS.					
East coast sea-salt	338,287	269,138	326,501	326,905	347,545
BENGAL.					
Orissa sea-salt	2,460	565	7,709	6,532	7,137
BURMA.					
Sea coast salt and Brine wells	11,861	13,234	17,517	19,245	17,365
TOTAL	851,370	790,490	1,237,025	1,129,601	976,693

Private Enterprise. 35. *GOVERNMENT AND PRIVATE ENTERPRISE.*—From the frequent mention that has already been made of the extent to which salt manufacture is passing into the condition of private enterprise, it will not be necessary to comment on the returns shown in the following table:—

Analysis of the Published Returns of Indian Marine Salt.

	1896.		1895.		1896.	1895.
	Manufactured by Government.	Manufactured otherwise than by Government.	Manufactured by Government.	Manufactured otherwise than by Government.	TOTAL.	TOTAL.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Madras	119,283	228,262	60,667	266,238	347,545	326,905
Bombay and Sind	122,899	222,726	111,376	308,040	345,625	419,417
Bengal	7,137	1,370	6,532	...	8,507	6,532
TOTAL	249,319	452,358	178,575	574,278	701,677	752,854

36. FOREIGN IMPORTS.—In this connection and in continuation of the remarks, paragraph 9, it may be desirable to give here a brief statement of the traffic in Foreign Salt, imported into India during the past five official years:—

Salt imported into all India from Foreign Countries.

	Tons.	Annual average cost per 100 maunds.	Percentage of increase or decrease in value on preceding year.
		R a. p.	
1891-92	373,953	64 11 11	—16·77
1892-93	360,042	61 9 3	— 4·89
1893-94	412,876	77 12 11	+26·35
1894-95	508,375	60 10 6	—22·04
1895-96	407,271	57 14 0	— 4·58

In order to indicate the countries from which these foreign supplies were drawn, the following table may be given:—

Countries from which India imports Salt.

	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.
	Tons.	Tons.	Tons.	Tons.	Tons.
United Kingdom	222,260	241,061	268,715	314,753	262,528
Germany	103,403	47,391	47,811	82,156	62,208
Arabia	9,840	25,887	21,475	19,418	11,068
Aden*	33,969	37,282	51,051	44,456	26,105
Other Countries	4,481	8,421	23,824	47,592	45,362
TOTAL IN TONS	373,953	360,042	412,876	508,375	407,271

37. IMPORTS IN RELATION TO CONSUMPTION.—The relation of imported salt to local manufactures specially along the coast may be shown by the following table:— **Consumption in relation to Imports.**

Consumption in relation to Imports in 1895-96.

PROVINCE.	Total consumption (official year).	Quantity imported (official year).	Percentage of imported salt to total consumption in 1895-96.	Percentage of imported lsat to total consumption in 1894-95.
	Tons.	Tons.		
Bengal	381,186	355,073	93·14	121·45
Madras	302,733	67	·022	0·03
Bombay, including Sind	257,668	279	·108	0·13
Northern India	282,422	...	...	...
Burma	45,534	51,852	113·87	144·79
TOTAL	1,269,543	407,271	32·08	40·67

* For annual Production of Salt in Aden, see Statement I, page 66.

SALT: TRADE. PROVINCIAL: Coastwise.

V.—INTERNAL OR PROVINCIAL TRADE IN SALT.

38. COASTWISE TRANSACTIONS.—By way of concluding this brief review of the Production and Consumption of Salt in the various provinces of India, it is only necessary now to show the shares in the traffic of distribution accomplished coastwise and by rail and river :—

Imports and Exports of Indian Salt Coastwise.

		1891-92.	1892-93.	1893-94.	1894-95.	1895-96.
		Tons.	Tons.	Tons.	Tons.	Tons.
Bengal	Imports into	24,195	23,707	21,149	27,358	15,071
	Exports from	*Nil.*	*Nil.*	*Nil.*	*Nil.*	*Nil.*
Bombay	Imports into	39,389	42,312	43,791	46,910	46,830
	Exports from	144,622	141,294	134,122	157,778	140,599
Sind	Imports into	223	205	205	281	281
	Exports from	227	208	211	286	280
Madras	Imports into	51,661	45,996	39,704	43,424	49,994
	Exports from	2,868	4,160	2,742	4,578	3,444
Burma	Imports into	1,833	1,702	1,626	2,626	5,041
	Exports from	1,106	2,143	1,813	2,438	3,177
TOTAL	Imports	117,301	113,922	106,475	120,599	117,217
	Exports	148,823	147,805	138,888	165,080	147,500

The interest in the coastwise trade in salt centres in the Bombay exports and in the extent to which these, both by coast and rail, are being distributed over India.

Rail-borne Traffic.

39. RAIL-BORNE TRADE.—The amount of salt carried on the railways and by boats and steamers on the rivers has been fully commented on in the Chapter on Areas of Consumption, but it may serve a useful purpose to give in this place an abstract of the returns during the past five years :—

Imports and Exports of Salt, carried by Rail and River, during 1891-96.

		1891-92.	1892-93.	1893-94.	1894-95.	1895-96.
British Provinces (Excluding Chief Seaports).		Tons.	Tons.	Tons.	Tons.	Tons.
Bengal	Imports into	280,553	289,480	276,716	296,507	282,342
	Exports from	5,072	4,276	3,600	3,136	4,873
Bombay	Imports into	828	827	854	1,110	937
	Exports from	115,429	111,900	131,643	122,210	121,221
Sind	Imports into	7,413	7,466	7,387	7,440	7,904
	Exports from	47	71	116	111	87
Madras	Imports into	78,197	83,566	86,785	85,188	83,410
	Exports from	5,136	5,792	4,241	7,138	7,716
N.-W. P. and Oudh	Imports into	145,397	164,621	150,594	142,557	148,852
	Exports from	2,741	2,903	2,643	2,481	2,549

***Imports and Exports of Salt, carried by Rail and River, during 1891-96*—continued.**

Rail-borne Traffic.

		1891-92.	1892-93.	1893-94.	1894-95.	1895-96.
		Tons.	Tons.	Tons.	Tons.	Tons.
British Provinces—continued.						
(*Excluding Chief Seaports*)—continued.						
Panjab	Imports into	10,716	12,098	9,315	10,093	10,535
	Exports from	17,773	16,299	14,023	14,940	15,173
Central Provinces	Imports into	55,108	54,265	57,685	57,868	56,691
	Exports from	563	860	872	925	799
Berar	Imports into	14,816	14,640	15,612	14,809	14,943
	Exports from	41	2	20	6	15
Assam	Imports into	23,813	22,989	20,581	23,927	23,597
	Exports from	5	18	28	27	8
Total of Provinces	Imports	616,841	649,952	625,529	639,499	629,211
	Exports	146,807	142,121	157,186	150,974	152,441
Native States.						
Rajputana and Central India.	Imports into	14,110	14,340	17,406	15,964	16,661
	Exports from	123,037	143,956	117,723	117,068	120,110
Nizam's Dominions	Imports into	30,577	31,171	28,178	32,037	29,546
	Exports from	44	87	48	54	80
Mysore	Imports into	13,444	16,246	16,604	16,388	17,131
	Exports from	4	7	7	2	25
Total of Native States	Imports	58,131	61,757	62,188	64,389	63,338
	Exports	123,085	144,050	117,778	117,124	120,215
Chief Seaports.						
Calcutta	Imports into	22	125	85	61	1,567
	Exports from	307,335	318,531	301,773	326,455	316,178
Bombay	Imports into	69	22	23	29	24
	Exports from	8,007	12,196	15,373	15,077	16,124
Karachi	Imports into	2	1	5	13	8
	Exports from	7,084	7,092	7,079	7,088	7,545
Madras ports	Imports into	4	18	2	295	841
	Exports from	82,751	87,885	88,643	87,578	82,486
Total of Seaports	Imports	97	166	115	408	2,440
	Exports	405,177	425,704	412,868	436,198	422,333
Grand Total	Imports	675,069	711,875	687,832	704,296	694,989
	Exports	675,069	711,875	687,832	704,296	694,989

II.—COAL (*Kóyelah, Hind.*).

COAL: PROSPERITY and OUTTURN.

VI.—PROSPERITY AND OUTTURN OF THE INDIAN COAL MINES.

[Correspondence File No. 172.]

Production.

40. Coal production in India continues to expand in a most significant manner. The output in 1894 came to 2,820,652 tons and showed thereby an increase on the production of 1893 of 10·10 per cent. The record of 1895 was not only the highest, but it manifested the greatest expansion attained up to that date. The output will be seen, Statement No. (*page 67*) to manifest for 1896 a production of 3,848,013 tons valued at Rr1,22,60,270. That is to say, an expansion of 8·76 per cent. on the returns of 1895 and of 29·41 per cent. on those of the average for the three previous years. The commercial imports of foreign coal in 1896 (excluding coke, patent fuel and Government stores) came to 746,850 tons being a decrease of 7·64 per cent. on the previous year's returns. When it is recollected that coal in India is entirely used up by the shipping, railways and factories, and that there is practically no demand for domestic purposes, the full significance of the figures of production and import are obtained. They represent directly the magnitude of India's commercial dealings with the world, the improvement in the facilities of internal communication, and the advancement of her manufacturing enterprise.

Import Traffic.

41. To a certain extent the import traffic in coal is governed by the exigencies of the export trade in jute, tea, etc., and consequently by the freights ruling. If low, coal, salt, and other such commodities are doubtless brought to the country, practically as ballast, by the shipping concerned in the export trade. Surplus stocks may thus temporarily be abnormally increased without the improvement of imports representing immediate demands. But no such explanation can hold good in the case of local production. The output of the Indian mines, fifteen years ago (say the average of the years 1879, 1880 and 1881) was just under one million tons, and India's total supply of coal was then approximately 1,500,000 tons. The amounts recorded above as the production and imports of 1896 show a total of 4,594,863 tons or an increase of 5·71 per cent. on last year's total supply (Indian and Foreign). Had coal, during the period of expansion indicated, begun to find its way into the domestic economy of the millions of population, that increase would have been of comparatively little moment. Indeed it may be added that, with the advance of civilization and the extension of European customs, the possibility of a vast demand for coal and coke to meet domestic necessities cannot be regarded as an improbable contingency.

Sudden expansion in production.

As against the prosperity indicated by the increased demand for coal, it may be pointed out that the import traffic in the mineral has for some years past practically remained stationary (*para. 44*), instead of expanding commensurately with the necessities for fuel. With the exception of the supply drawn by Bombay, the foreign coal traffic might be almost characterised as an adjustment of imports or exports rather than the supply of a commodity for which there is a steady demand. Indeed, it might be affirmed that the extinction of the trade is but a matter of time. Everything in fact points to a prosperity for the coal-mining industry that will eclipse even the achievements of the past few years.

Extinction of Imports.

Price.

VII.—REGIONS OF PRODUCTION AND SUPPLY.

PRODUCTION.

CHARACTER OF INDIAN COAL:

42. With the exception of Bombay and Sind, of Rajputana and Mysore, practically all the other Provinces and Native States contain coal. India in fact possesses an inexhaustible store of the mineral. But none of it belongs to the so-called carboniferous period of geologists. Indeed the Indian coal-measure rocks are not all of one formation. The coal of Peninsular India occurs in the Gondwana system, the fossil flora of which has mesozoic facies. The coal of extra-Peninsular India occurs in rock of cretaceous or tertiary age. The Gondwana beds are found in the Central and North-Eastern Provinces (*e.g.*, Western Bengal, the Central Provinces and the Nizám's Dominions) with scattered patches in the extreme north-east of the Madras Presidency. The tertiary coal may be traced along the outer margin of the Indo-Gangetic plains from Sind to Pegu, but it is only in Assam and Upper Burma that valuable cretaceous coal is met with. Some of the Indian deposits have only very recently been tapped and large areas rich in the mineral remain untouched, so that even the very encouraging results of the past two years' operations may be said to give but a foretaste of future possibilities.

Number of Collieries.

43. During the year under review there were 172 collieries at work, distributed as follows: 154 in Bengal; one in Madras; two in the Panjab; one in the North-West Provinces; two in the Central Provinces; six in Assam; two in Burma; one in Central India; one in the Nizám's Dominions; and two in Baluchistan. In 1895 there were 235 collieries; in 1894, 123 collieries; in 1893, 96 collieries; and in 1892 only 88 collieries. There has thus been a decrease of 63 collieries during the past year, but an increase of 21 on the average of the past three years. The labour force in 1896 has been returned at 61,958; in 1895 it was given as 57,919; in 1894 as 43,197; in 1893 as 37,679; and in 1892 as 38,645. It seems probable, however, that the figures of labour are not very complete. The census of 1891 gives the coal miners for that year at 35,512, whereas in the annual returns of the mines it stood at 34,827.

Producing Collieries.

The following statement may be given as the production since 1878, the qualification being offered that the returns of the earlier periods there shown, are believed not to have been so accurate as those of recent

years. The table as it stands, however, is instructive since it exhibits the relative dates of starting and the comparative production values of the great coal-bearing localities of India :— COAL: PRODUCTION.

Quantity, in Tons of Coal Produced in the Provinces of India.

YEARS.	Madras.	Bengal.	North-Western Provinces and Oudh.	Panjab.	Central Provinces.	Assam.	Burma.	Central India.	Nizám's Dominions.	Baluchistan.	TOTAL.
1878 .	...	957,243	...	...	57,967	...	...	...	...	...	1,015,210
1879 .	...	891,047	...	...	33,515	...	...	...	...	...	924,562
1880 .	...	988,565	...	...	31,228	...	...	...	...	...	1,019,793
1881 .	...	930,203	...	...	67,527	...	...	...	...	...	997,730
1882 .	...	1,038,872	...	...	91,370	...	...	...	...	...	1,130,242
1883 .	...	1,200,957	...	...	115,019	...	...	...	...	...	1,315,976
1884 .	...	1,257,392	...	...	121,833	16,493	...	2,100	...	...	1,397,818
1885 .	...	1,123,700	...	...	119,116	43,707	...	7,698	...	...	1,294,221
1886 *.	...	1,186,802	...	...	117,287	70,859	...	13,539	...	...	1,388,487
1887 .	...	1,319,090	...	7,523	128,981	89,302	...	15,497	3,259	411	1,564,063
1888 .	...	1,380,594	...	11,249	157,768	101,528	...	41,580	13,382	2,802	1,708,903
1889 .	...	1,541,356	...	22,835	144,465	116,676	...	52,956	59,646	8,238	1,946,172
1890 .	...	1,626,245	...	40,677	137,022	145,708	...	77,842	125,486	15,541	2,168,521
1891 .	20	1,747,122	...	60,714	141,736	154,208	...	69,741	144,668	10,368	2,328,577
1892 .	61	1,920,050	...	66,352	132,005	164,050	3,670	88,623	149,601	13,284	2,537,696
1893 .	502	1,902,866	...	77,294	135,118	164,420	9,938	94,348	157,421	20,094	2,562,001
1894 .	1,337	2,035,934	...	66,467	140,495	169,448	12,111	132,837	240,525	21,498	2,820,652
1895 .	1,737	2,716,155*	...	72,493	123,776	172,717	17,289	118,479	292,915	23,259	3,537,820*
1896 .	...	3,037,920	1,000	79,017	141,185	177,259	22,993	115,386	262,681	10,572	3,848,013

Indian Mines.

* *Vide* footnote to Statement No. I.—Coal, p. 67.

VIII.—PRESENT POSITION AND FUTURE PROSPECTS.

POSITION and PROSPECTS. FOREIGN SUPPLY.

4. ***FOREIGN COAL.***—It may now be desirable to exhibit some of the leading characteristics of the areas of supply, somewhat after the manner attempted above with salt, *viz.*, to denote the markets met by the various coal-producing centres. Imported foreign coal, as in the case with imported salt, will accordingly be treated as a centre of supply, and it will perhaps elucidate matters if the imports be disposed of in the first instance. The following table may be given of the total imports for the past fifteen years :—

Analysis of Imports of Foreign Coal into India during the past fifteen years.

(Coke and Patent Fuel, as also Government Stores have been excluded from columns 1 to 6 but included in the Grand Totals, column 7.)

YEARS.	1	2	3	4	5	6	7
	Into Bombay.	Into Sind.	Into Madras.	Into Burma.	Into Bengal.	TOTAL.	GRAND TOTAL, including Coke, Patent Fuel and Government Stores.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1881-82	404,243	13,376	37,714	77,523	85,044	617,900	648,201
1882-83	420,055	10,857	24,460	95,305	74,610	625,287	652,347
1883-84	491,776	17,593	28,294	78,312	62,534	678,509	712,900
1884-85	504,875	18,161	28,826	84,779	62,536	699,177	757,673
1885-86	528,499	35,769	34,662	63,091	97,047	759,068	805,700
1886-87	521,455	40,282	38,232	81,224	46,923	728,116	780,959
1887-88	572,358	38,803	28,204	111,589	49,206	800,160	886,680
1888-89	638,159	41,515	35,874	77,741	17,176	810,465	877,843
1889-90	431,200	31,596	41,662	47,036	21,297	572,791	656,867
1890-91	628,678	48,992	46,392	35,999	7,571	767,632	817,004
1891-92	561,651	53,053	41,528	47,843	20,120	721,195	773,624
1892-93	498,652	34,475	63,929	26,966	10,727	634,749	703,341
1893-94	423,094	32,677	63,206	19,230	5,799	544,006	591,007
1894-95	647,917	40,469	79,378	34,405	6,544	808,713	848,367
1895-96	559,709	40,533	108,337	32,271	6,000	746,850	787,114

Countries from whence obtained.

Conf. with page 24.

COAL: POSITION and PROSPECTS.

45. Column 1 shows the transactions with Bombay, and as stated in last year's review it will be at once perceived that the supply drawn from foreign countries has certainly not expanded concomitantly with the expansion of the manufacturing industries of the Western Presidency. Indeed during the past year the foreign imports taken by Bombay are 13·61 per cent. less than those of the previous year. The relation of the foreign coal supply to the Bombay mills may be exemplified as follows:—

FOREIGN CONTRIBUTION:

Analytical Statement of the Cotton Mills of India.

Years.	Number of Mills.	Number of Looms.	Number of Spindles.	Number of persons employed.
1881-82	62	14,386	1,550,944	52,231
1882-83	62	15,116	1,654,108	53,624
1883-84	74	16,251	1,895,284	61,836
1884-85	81	16,455	2,037,055	61,596
1885-86	89	16,548	2,198,545	71,577
1886-87	90	16,926	2,202,602	72,590
1887-88	97	18,840	2,375,739	80,515
1888-89	108	22,156	2,670,022	92,126
1889-90	114	22,078	2,934,637	99,224
1890-91	125	23,845	3,197,740	111,998
1891-92	127	24,670	3,268,524	117,922
1892-93	130	26,317	3,378,303	120,898
1893-94	137	29,392	3,539,681	130,570
1894-95	143	34,161	3,711,669	139,578
1895-96	147	37,278	3,844,307	146,244

Cotton Mills and their Coal supply.

Bombay.

46. To bring out the full bearing of the figures displayed in the above table, on the question of the coal supply of Western India, it is only necessary to add that the cotton spinning and weaving industry of India centres mainly in the Bombay Presidency—one might almost say in the town and neighbourhood of Bombay itself. In 1892-93, out of the total of 127 mills 88; in 1893-94, out of the total of 137 mills 95; in 1894-95, out of the total of 143 mills 99; and in 1895-96, out of the total of 147 mills, 101 were in Bombay. It will thus be observed that the returns of the imports of foreign coal into Bombay give no indications of having responded to the uniform and steady expansion of this great and important industry. And to the above table might have been added the figures to show the remarkable increase that has taken place throughout Western India in factories for ginning, cleaning, and pressing cotton. In 1895-96 these were returned as 209 in number, the total for all India having been 507. On the other hand, the trade revealed by columns 2 and 3 (table, page 15, *viz.*, the imports into Sind and the imports into Madras) may be said to have manifested a slow though steadily increasing demand for foreign coal. The rail-borne traffic from the Nizám's Dominions into Madras shows, however, an even more remarkable increase in the supplies drawn from the Singareni and Madras mines. Thus in 1891-92, the Madras imports of Indian coal were 53,918 tons (page 20), and in 1895-96 they came to 162,791. During the same periods the Madras seaports took of Indian coal 983 tons (page 21) in 1891-92, and 15,278 tons in 1895-96, a very remarkable increase. A further examination of the rail-borne traffic (pages 76—77) demonstrates the fact that the bulk of these quantities were derived from the Nizám's Dominions, namely, 139,520 tons taken by the Madras Presidency, and 1,158 tons by the port towns.

Burma.

47. The decline in the consumption by Burma of foreign coal, shown in column 4 (*table on page 15*), is doubtless due to some extent to the majority of the 66 rice mills of that province having almost simultaneously adopted the system of using up the rice husk as the fuel to drive their machinery. But in this connection it must be pointed out that Bengal coal has within the past few years entered into direct competition with the foreign supply obtained by Burma. On page 20 the coastwise traffic will be seen to have expanded from 78,448 tons in 1891-92 to 123,152 tons in 1895-96. The imports into Bengal (page 15, column 5) show so uniform and constant a shrinkage of the supply of foreign coal that it is impossible to avoid the belief of its being the reflex action of the expansion of the Bengal local production.

Bengal.

INDIAN PRODUCTION.

INDIAN COAL.—The areas at present open to foreign coal are therefore Bombay and Sind, Madras, and to a certain extent Burma. In another paragraph will be more fully displayed the strong competition that already exists for these markets, through local production. And it may be affirmed that the future will see a rapidly augmented competition on the part of the Indian mines.

Ben gal.

48. *BENGAL.*—During the year under review the mines of this province turned out **3,037,920 tons.** The value of that amount has been returned as R81,46,411. This Bengal production thus represents nearly 79 per cent. of the total for all India. It is also an expansion that amounts to **36·94 per cent.** on the provincial average production for the years 1893-95. During the year there were 154 collieries at work in Bengal, as compared with 220 in 1895, 109 in 1894, 82 in 1893, and 76 in 1892. These collieries may be grouped

according to the districts in which they occur, and their present comparative values indicated by the figures of last year's outturn :—

Burdwan	Collieries	1,782,937 tons.
Bankura	,,	14,972 ,,
Hazaribagh	,,	666,919 ,,
Manbhum	,,	571,356 ,,
Sonthál Parganas	,,	1,640 ,,
Darjeeling	,,	96 ,,
Total Production of Bengal Collieries		**3,037,920 tons.**

Bengal.

In the Burdwan district occur the following groups of mines :—the Raniganj, Kali-pahari, Asansol, Sitarampur, and Barakar—84 mines in all. In Hazaribagh the Giridih series, 6 mines. In Manbhum 66 mines, in the Sonthal Parganas 3 mines, and in Bankura 4 mines. It would perhaps be beyond the scope of a review of the year's production to go into much details regarding these Bengal mines, but a few statements regarding some of the chief fields may be here given in order to show the estimated available supply and consequently future prospects.

Of the ***KARHARBARI*** mines (Giridih)—200 miles from Calcutta—It has been stated that the field covers 8 square miles. The coal occurs in three principal seams. The estimated amount of coal has been put at 136,000,000 tons. The first mine opened in this field was the Kuldiha (1869), the Karharbari following in 1871. The Jubilee pit is 650 feet deep and is supposed to be the deepest coal shaft in India.

The ***RANIGANJ-BARAKAR*** coal field is about 130 miles from Calcutta. It covers 500 square miles with perhaps double that area dipping below the alluvial bed to the east. The available coal from these fields has been put at 14,000,000,000 tons. The first mine opened was the Raniganj in 1820.

JHERIA, in the valley of the Damuda and 16 miles west of Raniganj (District of Manbhum), has a field of 200 square miles calculated to contain 465 million tons.

BOKARO, two miles west of the Jheria field, covers 220 square miles, some of the seams of coal area 83 feet in thickness. The coal stored up in this bed has been computed at 1,500 million tons.

RAMGARH lies south of Bokaro. It is comparatively a small field, about 40 square miles, and is estimated to contain 5 million tons of available fuel.

NORTH KARANPURA is situated at the head of the Damuda valley. It has an area of 472 square miles and is said to contain 8,750 million tons of coal.

SOUTH KARANPURA is situated to the south-east of the northern field and is supposed to have 75 million tons of coal.

DALTONGANJ in the valley of the Koel in Lohardaga district, covers an area of 200 square miles and is estimated to contain 11,600,000 tons of excellent fuel.

TALCHIR in Orissa, a coal field of some 700 square miles in extent, is situate in the valley of the Brahmini. The coal is believed to be of inferior quality, but the field has not as yet been fully surveyed.

RAJMAHAL on the western margin of the hills of that district, is a coal field 70 square miles in extent.

DARJEELING coal field is not very important. It occupies a narrow zone which stretches along the foot of the Himalaya from Pankabari to Dalingkote. The coal is of Gondwana age, but much crushed, assuming the character of graphite.

49. ***CENTRAL PROVINCES.***—The mines of these provinces are located in the following districts and yielded last year the amounts shown :— **Central Provinces.**

Narsinghpur (***MOHPANI*** Mines)	19,542 tons.
Chanda (***WARORA*** Mines)	121,643 ,,
Total Production of Central Provinces Collieries	**141,185 tons.**

These returns show an increase on the production of 1895 of 14·98, and on the average of three previous years an increase of 6·31 per cent. The advance indicated has been entirely in the Government mines of Warora.

The ***MOHPANI*** field has its importance through its position with reference to the Great Indian Peninsula Railway. It is 95 miles by rail, west-south-west of Jabalpur. ***WARORA*** (including the Ghugus, Wun, Papur, Sasti, Paoni fields) has been estimated to contain 1,714 million tons, but of this wide area only Warora is being worked. Besides the fields actually worked there are others worthy of mention, such as the ***SHAHPUR*** and ***PENCH***. The former occurs on the south of the Tawa valley. It contains seams of irregular thickness and inferior quality. The latter contains many seams of fair quality. ***KORBA, MAND, RAIGARH-HINGIR*** fields, in the Mahanadi valley, cover an area of 1,000 square miles, and some of the seams of coal are very thick, two having been ascertained to be 90 and 168 feet respectively. The Korba area has so far proved the most worthy of consideration as the coal is of good quality.

50. ***CENTRAL INDIA.***—The only coal field of this area at present being worked is that of ***UMARIA*** in Rewah. The output last year came to 115,386 tons, valued at ₹3,82,485. Its great value lies in its position, 34 miles from Katni station on the East Indian Railway, and tapped by the Katni-Bilaspur branch. It is consequently the nearest source of supply for the North-West Provinces and the Panjab. This fact may be fully exemplified by an examination of the rail-borne returns. The exports of coal from Central India were returned in 1891-92 as 81,869 tons, in 1895-96 they stood at 100,639 tons, and **Central India.**

COAL: POSITION and PROSPECTS. INDIAN SUPPLY.

of the last-mentioned quantity the North-West Provinces and Oudh took 48,321 tons, the Central Provinces 38,032 tons, Bombay 13,417 tons, Berar 536 tons, and the Panjab 333 tons. (*See pages 76-77*) The Umaria field has an area of 3 square miles and has been estimated to contain 28 million tons of coal. But besides Umaria there are other coal fields in Central India of which the following may be mentioned:—***SOHAGPUR***, an excellent coal field of 1,600 square miles extent and only a short distance from Umaria. The Katni-Bilaspur Railway passes along its western margin. ***KORAR***, three miles north of Umaria, is a field of good coal of 9 square miles in extent and ***BISRAMPUR***—a coal field in the central basin of Sarguja—covers an area of 400 square miles of good coal suitable for locomotive purposes.

Nizam's Dominions.

51. ***NIZAM'S DOMINIONS AND MADRAS.***—The lower Godavari coal fields.

The most important mine in Southern India is the ***SINGARENI*** in the Nizám's Dominions. The output from that mine was last year 262,681 tons, being a slight decrease on the returns of the previous year but an expansion on the average of the three previous years of 14·06 per cent. The decrease in the output was owing to breaches on the Nizám's State Railway and on account of commercial restrictions; the mining capabilities of the collieries have, however, been increased. The immediate result of this expansion of production has been the steady growth of a by no means inconsiderable export to Madras and Bombay with a smaller amount to the Central Provinces. In 1891-92 this stood at 82,232 tons and in 1895-96 at 202,587 tons, of the latter figure 2,997 tons went to the Central Provinces. The respective shares taken by Madras and by Bombay of these rail-borne exports were: Madras 140,677 tons and Bombay 61,910 tons. (*See pages 76-77.*) The increasing importance of the Singareni mine is in fact one of the most significant features of the present Indian trade in coal. And with the completion of the East Coast Railway it will doubtless become even still more important. The sales during the year of the produce of the mine are detailed below—

	tons.
Great Indian Peninsula Railway	50,000
East Coast State Railway	27,000
Madras Railway	30,000
Southern Mahratta Railway	33,990
South Indian Railway	10,000
Bombay, Baroda and Central India Railway	24,075
The Nizám's State Railway	18,785
Other customers	51,350
TOTAL	245,200

The following is an analysis of Singareni coal made in 1893 by Mr. W. Marsh:—

Water=64·60 per cent.

Volatile hydrocarbons	25·16 per cent.
Fixed carbon	58·00 „
Ash	10·14
Loss	6·76
TOTAL	100·06
Coke	64·6 per cent.
Silica	6·01 „
Sulphur	1·20 „
Phosphorus	trace „
Sp. gravity	1·366 „

The sample comes under the head of a free burning, non-caking, oxygenated coal, and is very similar to some varieties of British coal such as those of South Staffordshire.

Madras.

KAMARUM, CHERLA, CHINNUR, MADAVARAM, and ***BEDDADANOL*** are coal fields that may be described as unexplored. Beddadanol is the most southern manifestation of coal in India. It covers an area of 5¼ square miles but contains worthless coal. ***KAMARUM*** is a field of good coal estimated equal to 1,132,560 tons. Its position in relation to present trade routes is somewhat unfavourable.

The Madras mines of this area are the ***BAJAHZOMPALLI***. These mines can hardly, however, be regarded as fully established. The output of 1895 expanded by 29·92 per cent. on the former year and 174·41 per cent. on the average of the three previous years. Recent discoveries would, however, seem to support the inference that most of the Godavari mines have a future of such promise especially in relation to the East Coast Railway, to a possible future iron smelting industry, and to the port of Vizagapatam.

Panjab.

52. ***PANJAB.***—Passing from the south to almost the extreme north-north-west of India another group of coal deposits is met with in the Panjab. On the salt Range nummulitic coal occurs at several localities, such as Amb, Sunglewar, Chamil, Kutta Karuli, etc., but only in small quantities. The ***DANDOT*** colliery in the Jhelam district possesses a more promising supply than either of the other localities just mentioned. The coal occurs at three places, but at its thickest is only about 2 feet 6 inches. The output from this mine has, notwithstanding the friable and pyritous condition of the coal, expanded considerably. The production of 1896 came to 79,017 tons, or an expansion of 8·99 per cent. on the return of 1895 and of 9·61 per cent. on the average of the three previous years. The coal is consumed (as also that of the Baluchistan mines) by

the North-Western Railway. At *PIND* there is a seam three feet in thickness and at the *BHAGANWALLA* colliery a seam even thicker than that at Pind. Both of these mines, however, are worked at a net loss. At *CHITAPAHAR*, *HAZARA*, and *BANNU* there are other coal fields as yet not fully explored. It may be doubted, however, whether the future will witness any material expansion of the Panjab mines. COAL: POSITION and PROSPECTS. INDIAN SUPPLY.

53. *BALUCHISTAN.*—The coal mines of this province are those at *KHOST*, *QUETTA* and *MACH*, the last-mentioned being prospective. It occurs in the Bolan pass. The production from the mines of the province came last year to 10,572 tons, showing a great falling-off from the quantity recorded last year, *viz.*, 23,259 tons. At Khost new dips have been opened to take the place of the older workings. The coal of these mines meets the demands of Sind-Peshin Railway. The Quetta supply is not very satisfactory. The coal from the Sharigh colliery is very friable and has to be made into briquettes before it can be used. Baluchistan.

54. *ASSAM.*—Cretaceous and nummulitic coal occurs at many isolated places throughout this province as, for example, in the Dufla Hills (a seam, by the bye, of Gondwana coal); in the Khasi and Jaintia Hills (Cherrapunji); in the Garo Hills (Darangiri); in the Lakhimpur district (Makum mines) and in the Naga Hills of Sibsagar. The Lakhimpur mines are situated in the neighbourhood of Margarita, and the wages of the coolies vary from R7 to R16 for men and R6 to R8 for women. Boys get R5. A noteworthy feature of these mines is that the borings are not vertical, but are made horizontally into the hillside. Coal is also extracted by the Khasis in the Khasi and Jaintia Hills, but excavations are small and the quantity taken out is barely sufficient to meet local requirements. With the opening up of railway communication it seems highly probable that several of the areas of supply will be very greatly developed. Assam.

The *MAKUM* mines are those alone that are being systematically worked at present. The field contains several seams, one of which is over 100 feet thick, 75 feet of which is good coal. The output last year came to 177,259 tons, being an expansion of 6,542 tons (3·62 per cent.) on the production of the previous year and of 8,952 tons on the average of the three previous years. It has been estimated that there may be 18,000,000 tons of coal. The trans-Dekho Naga mines are worked by the Assam Tea Company, the output of which in 1895 came to 92 tons. The Nazira and Jaipur Naga Hills supply has been calculated to come to 20,000,000 tons.

55. *BURMA.*—This province may be said to continue to give promise of being an important centre in coal supply. The output came last year (1896) to 22,993 tons, being an expansion on the production of 1895 of 5,704 tons (32·59 per cent.) and on the average of the three previous years of 9,880 tons (75·35 per cent.). The chief fields are the *THINGADAW* coal fields (Letkakpines mines, Shwebo district) on the west bank of the Irrawadi; there are three localities with seams of about four to five feet in thickness, consisting for the most part of good, hard, compact coal which often contains imbedded lumps of amber-like resin. On the *CHINDWIN* river near Kalewa, a 10-foot seam of good cretaceous coal occurs. In Arakan, Pegu (Thayetmyo mines) and Tenasserim (Mergui) coal is met with and to a small extent has been worked. Burma.

About one-quarter to one-third of the coal raised from the Letkonbin colliery, worked by the Burma Coal Company, consists of dust which is looked upon as refuse. Experiments are now being made to utilise this dust for briquette manufacture. A briquette machine has been erected and the compressed coal has proved thoroughly satisfactory in the locomotives and boilers of the company.

An analysis of the coal from this colliery gave the following results. By its side is placed an analysis of Kale creek coal from the Chindwin Valley made by Mr. D. Hooper in 1887 :—

	Letkonbin.	Kale creek.
Fixed carbon	55·71	59·29
Volatile matter	26·70	29·50
Ash	3·48	3·11
Moisture	14·11	8·10

The moisture in the first is somewhat heavy, but this is proved to decrease at a lower depth, and the percentage of carbon and volatile matter to increase proportionately.

IX.—INTERNAL TRADE IN COAL.

56. This section will deal with the distribution of the supplies mentioned in the foregoing remarks. The table given at page 16 shows the total imports of foreign coal to have been last year 746,850 tons; of that amount Bombay took 559,709 tons, Sind 40,533 tons, Madras 108,337 tons, Burma 32,271 tons, and Bengal 6,000 tons. These quantities were of course received by the port towns, and either used up there or portions distributed by rail and river or re-exported coastwise. Since the returns of the internal trade make no distinction as to whether the coal referred to is foreign or Indian, it is impossible to exhibit the ultimate distribution of the foreign supply further than has been given. The remarks that follow must, therefore, be understood as referring to both foreign and Indian collectively. Of course it is practically in the case of Bombay only that any ambiguity exists. TRADE. PROVINCIAL:

COAL: TRADE. PROVINCIAL: Coastwise Traffic.

The following statement of the Imports and Exports, coastwise, of Indian coal may be given for the past five years :—

Imports and Exports of Indian Coal Coastwise.

		1891-92. Tons.	1892-93. Tons.	1893-94. Tons.	1894-95. Tons.	1895-96. Tons.
Bengal	Imports into	940	492	3,044	5,951	8,131
	Exports from	123,087	195,760	246,456	189,619	351,025
Bombay	Imports into	206	50,330	73,015	58,421	121,602
	Exports from	...	11	...	173	10
Sind	Imports into	...	...	3,700	...	4,188
	Exports from	...	...	...	...	...
Madras	Imports into	40,514	48,479	37,496	44,788	27,825
	Exports from	76	519	68	120	165
Burma	Imports into	78,448	92,807	94,501	72,049	123,152
	Exports from	213	5	10	116	736
TOTAL	Imports	120,108	192,108	211,756	181,209	284,898
	Exports	123,376	196,295	246,534	190,028	351,936

The facts of most interest brought out by these tables will be seen at a glance. Bengal is the exporting province, and the statistics of the past five years show a rapidly increasing demand. Burma imports fully a third of these Bengal coastwise exports, and the supplies drawn by Bombay and Madras as well as those secured by Burma have manifested a steady progression.

Rail and River Traffic.

57. ***Rail and River Traffic.***—The amounts of coal carried by the railways during 1895-96 will be found in the Appendix (*pages 76-77*), but it may serve a useful purpose to give an abstract of the imports and exports from the chief centres during the five years 1891-96. The returns so tabulated may then be compared with the coastwise trade above and with the foreign imports (*page 15*), in order that the total imports or the total exports may be discovered, for each centre, during any one of the years in question. It may be here explained that the chief port towns (Calcutta, Bombay, Karachi and the Madras ports) are treated as if they were provinces, so that the trade of these large towns can be discovered apart from that of the provinces in which they are placed. The coal that passed over the East Indian Railway during 1894 came to 2,325,000 tons; during the past year (1896) that railway carried 2,879,056 tons; the Bengal Nagpur 570,928 tons; the Eastern Bengal 137,820 tons; the Great Indian Peninsular 172,392 tons, and the Nizám's Guaranteed Railway 229,804 tons. The total amount carried by all Indian Railways last year came to 4,505,758 tons.

The excess in that figure over the returns shown in the table (*pages 76-77*) is due to the same coal having passed over two or more railways or different directions, and been thus returned twice.

Imports and Exports of Coal, carried by Rail and River, during 1891-96.

Conf. with detailed statement, pages 76-77.

		1891-92.	1892-93.	1893-94.	1894-95.	1895-96.
British Provinces (Excluding Seaports).		Tons.	Tons.	Tons.	Tons.	Tons.
Bengal	Imports into	52,718	66,500	78,896	97,205	90,374
	Exports from	1,125,915	1,317,584	1,202,480	1,416,944	1,900,045
Bombay	Imports into	236,869	199,118	181,878	224,557	250,919
	Exports from	31,784	42,652	21,049	41,928	29,223
Sind	Imports into	14,708	6,357	4,769	7,075	10,789
	Exports from	3,117	792	40	15	81
Madras	Imports into	53,918	58,220	73,972	152,998	162,791
	Exports from	1,267	1,902	4,247	5,413	18,384
N.-W. P. and Oudh	Imports into	334,298	327,700	348,662	391,161	485,503
	Exports from	110,092	83,439	64,741	107,289	140,539
Panjab	Imports into	66,032	53,617	36,323	100,444	123,312
	Exports from	363	126	42	338	58

***Imports and Exports of Coal, carried by Rail and River, during 1891-96*—(contd.)**

		1891-92.	1892-93.	1893-94.	1894-95.	1895-96.
British Provinces (*Excluding Seaports*)—contd.		Tons.	Tons.	Tons.	Tons.	Tons.
Central Provinces	Imports into	76,384	85,972	88,656	73,300	76,259
	Exports from	71,843	64,894	82,662	67,408	74,175
Berar	Imports into	33,567	27,529	37,184	31,454	27,589
	Exports from	491	627	1,841	571	247
Assam	Imports into	7,803	8,428	8,485	3,561	3,929
	Exports from	97,478	75,277	64,721	69,333	70,342
Total of Provinces	Imports	876,297	833,441	877,835	1,083,755	1,231,525
	Exports	1,442,150	1,587,293	1,442,729	1,709,259	2,233,094
Native States.						
Rajputana and Central India.	Imports into	83,463	81,230	39,848	73,707	77,011
	Exports from	81,869	75,363	97,544	98,219	100,639
Nizám's Dominions	Imports into	226	67	289	88	89
	Exports from	82,232	77,967	100,455	201,076	205,584
Mysore	Imports into	33,298	56,935	68,245	81,621	97,289
	Exports from	43	2	13	817	224
Total of States	Imports	116,987	138,232	108,382	155,416	174,389
	Exports	164,144	153,332	198,012	300,112	306,447
Chief Seaports.						
Calcutta	Imports into	871,656	998,883	854,709	1,013,084	1,406,611
	Exports from	39,548	35,378	41,918	43,034	37,006
Bombay	Imports into	6,075	8,096	12,677	10,761	17,342
	Exports from	159,516	120,781	84,411	103,603	139,186
Karachi	Imports into	180	791	12	.....	69
	Exports from	15,194	6,567	5,403	7,425	13,158
Madras Ports	Imports into	983	980	1,367	3,726	15,278
	Exports from	51,626	76,672	82,509	103,309	116,323
Total of Seaports	Imports	878,894	1,008,750	868,765	1,027,571	1,439,300
	Exports	265,884	239,798	214,241	257,371	305,673
Grand Total	Imports	1,872,178	1,980,423	1,854,982	2,266,742	2,845,214
	Exports	1,872,178	1,980,423	1,854,982	2,266,742	2,845,214

58. A glance at the figures given in the table above, of the rail and river-borne IMPORTS OF COAL during past five years, will suffice to convey the impression that there are three very important directions in this trade. These are *in order of magnitude* the imports of Calcutta; the imports of the North-West Provinces and Oudh; and the imports of the Presidency of Bombay. But it will also be readily perceived that there are two features of the import traffic that owe their interest to their *comparative insignificance, viz.*, the rail-borne imports of the town of Bombay and of the sea-ports of Madras. Lastly, there are six items that are distinctly of value because of their each indicating a steadily *expanding demand* for coal, *viz.*, the imports of the Province of Bengal; the imports of the Presidency of Madras; the imports of the Panjab; the imports of the Central Provinces; the imports of Rajputana; and the imports of Mysore.

It will be instructive to analyse very briefly these specially interesting aspects of the rail-borne coal imports

59. (*a*) Calcutta received by rail 871,656 tons of coal in 1891-92 and 1,406,611 tons in 1895-96 (*Conf. table previous page*). This is an expansion of 61·37 per cent. during the years named. A correspondingly instructive feature is the expansion of the Coastwise Exports of Indian Coal. These in 1891-92 stood at 123,087 tons and last year at 351,025 tons or an expansion of 183·5 per cent. Her rail-borne exports have averaged, say, 40,000 tons mainly to Eastern Bengal and Assam. It may be useful to give here a balance sheet of the Calcutta coal trade for the past five years showing the net supply to the city and its immediate neighbourhood.

Coal Supply of Calcutta.

Analysis of the Coal, Coke and Patent Fuel Trade of Calcutta (Bengal).

	Imports.				Exports.				Net Supply of Calcutta.
	1 (Page 15 Excluding Coke.)	2 Page 20.	3 Page 21.	4	5	6	7	8	9
	Foreign. (Coal and Coke.) Tons.	Coastwise. Tons.	Rail. Tons.	Total Imports. Tons.	Foreign. Tons.	Coastwise. Tons.	Rail. Tons.	Total Exports Tons.	Deduct total Exports (column 8) from total Imports (column 4). Tons.
1891-92 . .	22,812	940	871,656	895,408	4,509	123,087	39,548	167,144	728,264
1892-93 . .	12,831	492	998,883	1,012,206	15,725	195,760	35,378	246,863	765,343
1893-94 . .	8,113	3,044	854,709	865,866	51,225	246,456	41,918	339,599	526,267
1894-95 . .	9,138	5,951	1,013,084	1,028,173	53,665	189,619	43,034	286,318	741,855
1895-96 . .	9,280	8,131	1,406,611	1,424,022	80,169	351,025	37,006	468,200	955,822

The figures shown in column 9 may be regarded as representing the annual consumption since the surplus stock may be assumed to be on the whole a constant quantity. The figures for the past five years show an expansion of the Calcutta demand that comes to 31·2 per cent.

N.-W. P. Increasing consumption.

60. (*b*) The North-West Provinces and Oudh received 334,298 tons of coal by rail during 1891-92 and 485,503 tons in 1895-96 or an expansion that comes to 45·23 per cent. By consulting the details of that traffic it is discovered that in 1891-92 Bengal province furnished 278,486 tons or 83·30 per cent. of the total and in 1895-96, 436,809 tons or 89·97 per cent. of the supply to these provinces. Then again we learn still further that the North-West Provinces derived their next largest contribution from Central India, doubtless from the Umaria coal mine chiefly. In 1891-92 they imported from Central India 55,425 tons or 16·57 per cent. of the total imports, and in 1895-96, 48,320 tons, being 9·95 per cent. on the supply of that year. But turning attention for the moment to the exports of coal by rail from these provinces, we learn that these were 110,092 tons in 1891-92 and had increased to 140,539 tons in 1895-96, or an expansion of 27·65 per cent. These exports have accordingly to be deducted from the returns shown in the table of imports in order to arrive at the net supply, what, by ignoring a constant surplus stock of slightly variable quantity, may be called the annual consumption. During the years in question the net supply was 224,206 tons in 1891-92; 244,261 tons in 1892-93; 283,921 tons in 1893-94; 283,872 tons in 1894-95, and 344,964 tons in 1895-96. Thus the consumption of these provinces has manifested a steady and substantial increase during the past five years. The exports go mainly to the Panjab, the balance to Rajputana, the Central Provinces and Bombay.

Bombay Presidency.

61. (*c*) Bombay Presidency rail-borne imports of coal are very significant. While manifesting occasional fluctuations they have shown a tendency to improve. They were, as will be seen from the table (*page 20*), 236,869 tons in 1891-92 and 250,979 tons in 1895-96. But it may be interesting to examine with more detail these imports especially with relation to the sources of supply. During the year 1891-92, 149,719 tons were drawn from the port town (presumably foreign coal), 46,564 tons derived from the Nizám's Dominions (Singareni coal), and 39,924 tons derived from the Central Provinces (Warora and probably also Mohpani coal). Last year the corresponding figures were: foreign coal 133,768 tons (10·65 per cent. decrease); Singareni 59,389 tons (27·54 per cent. increase), and 43,474 tons Warora and Mohpani (8·89 per cent. increase). At the same time the exports have similarly fluctuated but made no material change. The average for the past five years comes to 33,500 tons and last year's actual exports stood at 29,223 tons.

It will thus be seen that the character of the Bombay Presidency supply has been considerably changed within recent years. The production at the Indian mines is distinctly checking the trade in imported coal, thereby releasing larger quantities of that coal to meet the growing demands of the town of Bombay itself.

62. (*d*) But turning now to the Bombay port town rail-borne transactions, the total imports in 1891-92 were 6,075 tons, and of that amount 5,908 tons were drawn from the Presidency, 125 tons from the Nizám's Dominions; and 27 tons from Berar. The corresponding figures for 1895-96 were total rail imports by port town of Bombay 17,342 tons, of which 14,731 tons were derived from the Presidency, 2,520 tons from Nizám's Dominions, 90 tons from the Central Provinces and none from Berar.

By way of concluding this statement of the Bombay traffic in coal it may be desirable to show the net supply of the town of Bombay, by way of comparison with that given above for Calcutta. This will be derived by deducting the tota of all exports (by sea and by rail) from the total of all imports consigned to the town of Bombay.

Analysis of the Coal, Coke and Patent Fuel Trade of the Town of Bombay.

	Imports.				Exports.				Net Supply of Bombay.
	1 (Page 15 Excluding Coke.)	2 Page 20.	3 Page 21.	4	5	6	7	8	9
	Foreign. (Coal and Coke.) Tons.	Coastwise. Tons.	Rail. Tons.	Total Imports. Tons.	Foreign. Tons.	Coastwise. Tons.	Rail. Tons.	Total Exports. Tons.	Deduct total Exports (column 8) from total Imports (column 4). Tons.
1891-92	566,231	206	6,075	572,512	5	*Nil*	159,516	159,521	412,991
1892-93	504,083	50,330	8,096	562,509	*Nil*	11	120,781	120,792	441,717
1893-94	427,805	73,015	12,677	513,497	2	*Nil*	84,411	84,413	429,084
1894-95	653,729	58,421	10,761	722,911	*Nil*	173	103,603	103,776	619,135
1895-96	565,631	121,602	17,342	704,575	650	10	139,186	139,846	564,729

It will thus be seen that the consumption of the town of Bombay for the shipping, mills, factories, railways, etc., has manifested extreme fluctuations, but may, on the whole, be regarded as improving, the expansion since 1891-92 being 36·74 per cent. The improvement has been chiefly in the increasing sea-borne imports of Bengal coal, with a slight increase in the supplies drawn by land routes from the Singareni mines, and not in any improvement in the foreign imports. A noticeable feature of the above analysis of the traffic with the town of Bombay is the fluctuating decline in the rail-borne exports. This, as already remarked, may be taken as the direct result of the increased Indian production, penetrating to the mills and railways of the Presidency in such quantity as to tell on the demands for English coal.

Comparing year by year the net consumption of Bombay town for the past five years, with the corresponding figures for Calcutta, it will be seen that the latter took in 1891-92 315,273 and in 1895-96 391,093 tons more than the Western capital. This to some extent is doubtless due to the extensive steamer traffic on the rivers of Bengal and Assam.

Madras Ports.

63. (*e*) Sea-port Towns of Madras Presidency are remarkable because of the small amounts of coal carried to them by the railways. This is doubtless due to their distance from the mines, but the fact is none the less significant. In 1891-92 the total rail-borne imports into these ports came to 983 tons and in 1895-96 it had expanded to 15,278 tons (*See table page 27*). An important feature of the modern returns is the growth of the supply drawn from the Singareni mines which to a great extent must account for the very remarkable increase this year. In 1891-92 this came to 23 tons and in 1895-96 to 1,158 tons. (*See pages 76-77*).

Bengal Province.

64. (*f*) The rail-borne imports of coal by the Province of Bengal have expanded from 52,718 tons in 1891-92 to 90,374 tons in 1895-96, the latter showing a slight decrease, however, on the figures of the preceding year. The items of that supply last year were Assam 55,828 tons and Calcutta 34,484 tons. The latter goes to the Railways of Eastern Bengal *viâ* Calcutta.

Madras Presidency.

65. (*g*) The rail-borne coal traffic of the Presidency of Madras has similarly manifested a considerable expansion. It stood at 53,918 tons in 1891-92 and had expanded to 162,791 tons in 1895-96, or an expansion of **201·92 per cent.** The imports of the former year were 35,520 tons from the Nizám's Dominions, and 18,360 from the seaports. Of the latter year they were 139,520 tons from the Nizám's Dominions, and 23,046 tons from the port towns with small amounts from Mysore and Bombay. In the Presidency Singareni coal is thus rapidly displacing foreign coal, the expansion of the supply having been **292·79 per cent.** during the past five years. As against these figures, the exports from the Presidency may be characterised as nominal.

Panjab.

(*h*) The expansion of the Panjab supply by railway similarly manifests the drain that year by year is becoming heavier and more direct on the Indian production. In 1891-92 the Panjab imported 66,032 tons and in 1895-96, 123,312 tons, or an expansion of **86·74 per cent.** In the former year the supply was derived as follows:—55,045 tons from the North-West Provinces; 7,329 tons from Bengal and 487 tons from Karachi (foreign coal). Last year the chief items of the supply were 95,154 tons from the North-West Provinces; 25,429 tons from Bengal; 11 tons from Bombay; 333 tons from Central India (Umaria coal); and 2,373 tons from Karachi.

Central Provinces.

66. (*i*) In the Central Provinces the imports were in 1891-92, 76,384 tons, and in 1895-96 76,259 tons; these quantities show a remarkable uniformity. The exports also considerably resembled the imports so that the Bengal mines and the Umaria mines may be supposed to have furnished coal to the districts in their neighbourhood, while the coal mines of Chanda and Narsinghpur restored the balance of the provincial requirements by their exports to other provinces.

COAL: TRADE. PROVINCIAL: Assam.

67. (*j*) Assam, from the table (*page 21*), will be seen to be distinctly an exporting province. In 1891-92 it exported by rail and river 97,478 tons and in 1895-96, 70,342 tons. The year 1891-92 showed the highest record. The imports, as already remarked, are drawn from Calcutta.

Rajputana.

68. (*k*) The rail-borne imports shown in the statement against Rajputana and Central India are approximately the supplies drawn by Rajputana. Central India with its Umaria mines is an exporting province.

The subject of the Umaria mines has been so often alluded to already that it may be dismissed with the remark that the rail-borne trade of the past five years shows an expansion of 22·92 per cent.

Nizam's Dominions.

69. (*l*) The Nizam's Dominions rail-borne traffic may, like that of Central India, be dismissed with a few words. Repeated reference has been made to the rapidity with which the Singareni coal is finding its way over Madras and Bombay. The exports show an expansion of 150·00 per cent. during the past five years.

It may thus be admitted that the returns of the Rail and River-borne Traffic abundantly support the statement that Indian production is displacing imported coal. The growing demand demonstrates the rapid advancements that are being made in railway extension and the rise of a manufacturing enterprise that will sooner or later be felt in all the markets of the world.

IMPERIAL.

X.—FOREIGN TRADE IN COAL.

Exports of Indian Coal to Foreign Countries.

70. By way of concluding this account of the coal production and trade of India it is desirable to give some further particulars of the Foreign Trade, *viz.*, to the countries to which Indian coal is exported and the foreign countries from which India's imports are derived.

Bengal Coal exported to Foreign Countries.

Table showing the Exports of Bengal Coal to Foreign Countries, exclusive of Coke and Patent Fuel.

Year.	To Ceylon.		To China.		To Straits Settlements.		To Java.		To Mauritius and the West Indies.		To Arabia and Africa.		To other Countries.		Total.	
	Tons.	£	Tons.	£	Tons.	£	Tons.	£	Tons.	£	Tons.	£	Tons.	£	Tons.	£
1891-92 . .	1,000	10,000	Nil	Nil	2,100	21,000	Nil	Nil	Nil	Nil	250	2,250	1,014	10,136	4,364	43,386
1892-93 . .	13,379	1,36,230	Nil	Nil	3	150	Nil	Nil	1,318	13,358	Nil	Nil	320	2,630	15,020	152,388
1893-94 . .	28,044	2,60,801	Nil	Nil	14,792	153,860	Nil	Nil	3,638	32,504	5,720	57,200	7	110	52,201	504,475
1894-95 . .	47,820	4,42,901	Nil	Nil	5,277	52,845	Nil	Nil	Nil	Nil	368	3,680	900	800	53,365	500,226
1895-96 . .	48,882	5,15,697	Nil	Nil	26,344	255,340	Nil	Nil	4,760	77,500	Nil	Nil	3	42	79,989	848,579

It will be observed that the foreign exports are mainly to Ceylon. Coal goes to Colombo to meet the demands of the steamer traffic with India and the East generally. It is not consumed locally to any appreciable extent. But the supply thus met by Bengal used formerly to be drawn from Europe, so that the increasing shipments are a direct indication of the competition of the Indian with the European coal. The supply to the Straits Settlements is not very important and might be treated as a set-off against the very inferior coal that Japan supplies to Bombay.

71. The table given on page 15 will be found to manifest the amounts of coal drawn by the various provinces of India from foreign countries. It is desirable to give here the other view of that traffic, namely, the countries from which these imports are derived.

Table to show the Chief Foreign Countries from which India obtains Coal, Coke and Patent Fuel—Excluding Government Stores which see page 25.

Foreign Countries whence obtained.

Conf. with page 15—Receiving Provinces.

Countries.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.
	Tons.	Tons.	Tons.	Tons.	Tons.
United Kingdom	716,665	627,032	531,043	775,017	734,336
Belgium	76	130	...	2,271	200
Germany	927	300	132	2,255	60
Cape Colony	233	180	47	245	115
Egypt	247	...	10	...	96
South America	40	1,087	103	1,194	38
Aden	250	143	193	...	70
Ceylon	483	56	369	4,424	149
Japan	4,720	1,900	11,331	8,531	10,588
Australia	12,585	16,942	11,155	27,767	15,349
Other Countries	715	415	897	1,610	995
Total . .	736,971	648,185	555,280	823,314	761,996

The supply furnished by the United Kingdom (exclusive of Government Stores) which averages about 96 per cent. of the total, may be said to have shown indications of decline. This may be borne out by giving the figures for the five years previous to 1890-91 as follows:—From the United Kingdom in the year 1885-86, 746,554 tons; 1886-87, 730,813 tons; 1887-88, 810,489 tons; 1888-89, 813,821 tons, and in 1889-90, 552,071 tons. Fluctuations have thus taken place, but the average of the first half of the past decade (1885—1896) was distinctly higher than the average of the second half.

The table above would show the supply drawn from Australia to be improving, but if observation be carried further back, this is revealed as a false inference: thus imports by India from Australia 1885-86, 38,261 tons; 1886-87, 30,640 tons; 1887-88, 35,065 tons; 1888-89, 17,290 tons, and 1890-91, 45,320 tons. The second half of the past decade has thus marked a very considerable contraction in the Australian supply. But the trade from Japan to India (which goes to Bombay) manifests, on the other hand, a very considerable expansion. The first consignment was received in 1887-88, *viz.*, 1,550 tons, since which time it has shown many fluctuations but a general upward tendency.

XI.—COKE AND PATENT FUEL.

72. In the above table coke and patent fuel have been combined with the returns of coal. The table, page 15, shows coal by itself and also the grand total, including coke, patent fuel and Government stores (*e.g.*, imports of coal, coke, etc., on behalf of Government). It may, perhaps, be instructive as showing to what extent the Indian mines have contested the demand for coke and patent fuel to give here the returns of foreign imports for the past ten years. It may be remarked that up to the year 1893-94 the whole of the coke and patent fuel was obtained from the United Kingdom. In the year mentioned, however, South America furnished the quantity of patent fuel shown, and in 1894-95 Germany contributed 426 tons of coke, and Belgium 1,675 tons of patent fuel. In 1895-96 Great Britain supplied 14,231 tons of coke, the balance on total imports came from Germany and Australia. The patent fuel came last year from Belgium and Madagascar.

Years.	Coke in tons.	Patent Fuel in tons.
1885-86	11,375	20,487
1886-87	7,733	29,819
1887-88	10,554	38,164
1888-89	11,732	11,281
1889-90	9,765	19,114
1890-91	9,339	7,393
1891-92	12,766	10
1892-93	12,536	900
1893-94	11,257	17
1894-95	12,426	2,175
1895-96	14,396	750

Mr. James Grundy in his *Report on the Inspection of Mines in India, 1895*, page 111, says "coal and coke appear to be displacing timber for private and public cooking purposes in various parts of India. I am told that there is a fair demand and a steadily increasing market for crude coke, and that its use for the cooking and other fires in the up-country bazars is becoming extensive. I am also told that it is not unusual to work out coal at an all round cost of not more than ₹1-8 a ton; that good coal has sold at the pit as high as ₹5-4 to ₹5-8 a ton, and that a profit of ₹2 a ton was not thought to be excessive."

XII.—GOVERNMENT STORES IN COAL, COKE AND PATENT FUEL.

73. The demands of Government for foreign coal, coke, etc., are not very extensive and may be said to have been steadily declining for some years past:—

Years.	Coal in tons.	Coke in tons.	Patent Fuel in tons.	Total in tons.
1891-92	35,514	1,139	...	36,653
1892-93	47,248	3,893	4,015	55,156
1893-94	32,639	2,084	1,004	35,727
1894-95	23,753	1,300	...	25,053
1895-96	21,450	3,618	50	25,118

These Government imports are almost entirely consigned to Bombay with small quantities to Madras and Burma.

III.—IRON ORES (*Lohá, Hind.*).

XIII.—OCCURRENCE OF IRON ORES.

74. Iron ores exist all over India, especially in Madras (as, for example, in the Salem, Bellary, and Kurnool districts); in the Central Provinces (about Warora and Jabalpur); in the hilly districts of Western Bengal; and in Ranawao and Rampur in Kathiawar. In Bengal alone, however, where coal can be had in close proximity to the ore, is smelting carried on after European methods.

[*Correspondence File No. 174.*]

IRON : PRODUCTION.

XIV.—PRODUCTION OF IRON.

75. During 1896, the total production of Iron in India (see Statement I., *page 68*) was 13,776 tons. I compared with the previous year, that figure shows a considerable decrease in outturn of 70·09 per cent. and of 66 per cent. on the average of the three previous years.

There is, however, reason to believe that very little, if any, reliance can be put on these figures. It is even possible that some of the returns refer to iron ore, and others to crudely manufactured pig iron. It very possibly takes from 45 to 60 cwt. of iron ore to make one ton of pig iron.* Any confusion, therefore, of the nature indicated would render the statistics meaningless. But even were there no such error, the returns furnished would appear to be the actual records of certain transactions, which very possibly by no means denote the total production.

The primitive smelters scattered all over the country keep very little account of the amount of ore used by them in producing the crude iron which they dispose of to the local blacksmiths. So very general and widespread is this primitive smelting (of which it is believed no cognisance is taken in these returns) that it would be unsafe to assume that a province, shown in the Statement I. below, as producing no iron, has no local supplies of that metal. The absence of returns should rather be taken as denoting the absence of any large smelting furnaces. Though there are remarkably few furnaces in the provinces of India, nearly every town has foundries and workshops, where Indian or imported pig iron and scrap iron are worked up. It is, therefore, probable, at least for some time to come, that statistics of the foundries and Native smithies would afford a more tangible conception of the iron interests of India than is conveyed by the tabulation of actual returns of indigenous ore.

BENGAL.

76. *BENGAL.*—The production of this province has been given as 6,120 tons valued at ₹11,965, a valuation that would show the crude ore as costing ₹1-15-3 a ton. As compared with the returns of 1895 production for the year under review would manifest a decrease of 80·99 per cent., or on the average of the three previous years of 78·87 per cent. The Barakar Iron Works may almost be spoken of as the only source of locally produced iron in the province. The actual figures furnished by the Government of Bengal are Hazaribagh 84 tons; with in addition 370 tons of black iron slag stone in Dacca valued at ₹200 and 320 tons of iron slag in Monghyr. The last two amounts have not been included in Statement No. I. (*page 68*) as iron ore.

No figures are forthcoming from the Commissioner regarding the production of iron ores in the Burdwan Division, but it is reported by the Commissioner of Burdwan that 6,016 tons 11·2 cwts. of iron ores were purchased by the Bengal Steel and Iron Works at a total cost of ₹10,664-2-0. The Commissioner of Bhagalpur returned 20·93 tons as the production of iron ores valued at ₹853-8. Evidently the quantity is for the finished metal, as will be seen from the remarks made by the Commissioner in 1895 with regard to this subject :—"The iron ore, as collected from the ground, is smelted and made into pig iron, which is locally called *Bhuga*, and then sold to smiths. Generally the pig is half the weight of the ore. Again, the smiths have to smelt the pig to separate the pure metal. The weight of pure metal is from ⅓ to ½ or even less than the pig. The ore is not sold, and therefore the rate of price reported was for the pig iron or the ore smelted into pig."

In the *Financial and Commercial Statistics of British India*, Fourth issue, the Barakar Iron Works are shown to have given employment during 1895 to 682 persons and to have produced 17,455 tons of pig iron valued at ₹9,03,946. As pointed out in last year's review, the production of iron ore in the Province of Bengal (as furnished to this office) will not agree with the published production of pig iron at the Barakar Works. If it be accepted that it takes 2½ tons * of iron ore to yield one ton of pig iron or 40 per cent., the consumption of ore at the Barakar Works must have been 43,637 tons or, say, 37,500 tons in excess of the total recorded production of ore for the entire province. Worked out from the data furnished by the Barakar Works their pig iron cost ₹51-12-7 per ton. The rail-borne returns in the Appendix (*page 81*) will be seen to manifest an export from Bengal of 7,429 tons of iron, of which more than half was consigned to Calcutta and 1,723 tons to the North-West Provinces, the balance going to the Central Provinces, the Panjab, Central India and Assam. It may be assumed that the major portion of these provincial exports represent Barakar iron. During the same period Calcutta exported 70,073 tons of iron, a considerable proportion of which was doubtless imported pig iron. This cannot be definitely determined, however, since the distinction into the various classes of iron is not recorded. Of the Calcutta exports, about one-half were consigned to the province of Bengal; a little less than one-fourth (17,358 tons) went to the North-West Provinces, over one-seventh (10,306 tons) to Assam, the balance being consigned to the Panjab, to the Central Provinces and to Central India.

BOMBAY.

77. *BOMBAY.*—In 1840 Captain Legrand Jacob reported on the iron of Kathiawar and its production in Panawao and Ranpur. The ore was obtained from the Barda Hills and the charcoal for the furnaces was prepared in the neighbourhood. The smelting was carried on in a simple manner in furnaces which turned out five to seven maunds a day. The workmen were paid in cowries, and the manufacture was

* A figure that is probably under the actual requirements; in a report furnished from Anantapur, Madras, it is stated that 5 tons of iron were obtained from 35 tons of ore (14·2 per cent.).

profitable while it lasted, the outturn reaching 150 tons a year. The mines were abandoned on the arrival of increased supplies of iron from England.

CENTRAL PROVINCES.

78. ***CENTRAL PROVINCES.***—Iron ore is chiefly obtained in Chanda, Narsinghpur, Bhandara, Raipur and Jabalpur. The mines are worked by Agaryas and aboriginal tribes, especially the Gonds, and daily wage is about 4 annas. It has been pointed out by the reporting officer that the values returned for ron ore are extraordinarily discrepant, a fact doubtless due to some of the figures being intended to express crudely made pig iron and not iron ore. As already remarked, it is to be feared this error applies to a distinct percentage of all the provincial returns, and it might accordingly very possibly be commendable to abandon the tabulation of ore and to endeavour to procure statistics of locally produced iron. The ore is, in the majority of districts, found on the surface of the ground. The persons who collect it can give no trustworthy estimates either of the amount so collected or of the prices obtained. Much of it is also crudely smelted before it reaches the recording centres, so that while given as ore by one officer it is correctly tabulated as iron by another. In a country, such as India, that possesses practically no smelting works, it will be readily recognised that an industry of picking up, and at odd times too, a block of iron ore here and another there, can never be estimated and tabulated with anything more than the merest approximation to truth. Instead of being regarded as actual returns of ore, the statistics given should rather be viewed as denoting the provinces and districts where the metal occurs.

Following the customary procedure it may, however, be stated that the production of 1896 denotes a decline equal to as much as 70·33 per cent. on the record of 1895. Jabalpur alone produced 369 tons valued at R434. In Balaghat the ore was not quarried but collected from the hills wherever it was found.

MADRAS.

79. ***MADRAS.***—With the opening of the East Coast Railway and the discovery of workable seams of coal within practicable distance, great progress may be witnessed in the future. The actual amount of iron ore collected has been given as 2,296 tons. The districts that participated in that trade were Malabar (by far the most important so far as the figures indicate), Salem and Anantapur. The Native State of Sanduru is, however, shown as having produced a larger quantity than any of the above-mentioned districts. The total output given, however, for the presidency presents a decrease of 18·81 per cent. on the production of 1895, but the reader, after having perused the remarks offered in connection with the Central Provinces, will see that no good can be expected by contrasting the figures of one year with those of another when they are submitted in both cases as "only rough guesses made by village officers."

80. From the *Annual Administration Report of the Forest Department, Madras Presidency*, for the year ending 30th June 1896, page 46, paragraph 76, we learn that the question of reviving the Salem iron industry has occupied the attention of the Madras Government since 1893. Various reports were furnished; in 1895 the information collected was communicated to various mercantile bodies and persons interested, while the correspondence which had ensued was forwarded to the Secretary of State. It was desired to ascertain whether the papers indicated the likelihood of conducting in Salem an industry corresponding to the iron industries of Styria and of America. The Imperial Institute on being consulted asked Mr. Jeremiah Head, the well-known iron expert, for a report and an opinion. It might be added that high class ore in good quantity is readily obtainable. The question of its manufacture turns chiefly upon the supply of the necessary fuel, whether charcoal or coke. The cost of coal being prohibitory, it remains to be seen whether a regular supply of charcoal in adequate quantity and at a sufficiently low price can be forthcoming, so as to compete with European imports. The subject is stated to be still under enquiry.

81. It may be of interest to republish in this place a few passages from a very instructive paper published by Mr. T. H. Holland of the Geological Survey as showing the character of the Madras (Native) smelting—

"The manufacture of iron and steel, for which India has been celebrated for hundreds of years, is still practised in all its primitive rudeness in the southern districts of Madras Presidency. In Malabar the industry is in the hands of Mahommedan Moplahs; in Trichinopoly men of the Karuman caste have, until recently, made wrought iron, but are now principally engaged in the production of wootz by the cementation in crucibles of wrought iron imported from the Salem district. In this latter district, and to a smaller extent in the north-west of Trichinopoly, Kattipariahs make wrought iron and steel; but the latter is made by an entirely different process from that of the crucible-steel or wootz of the Karumans."

Manufacture of Wrought Iron.

"Wrought iron is made direct from the ore by smelting with charcoal, the method, though extremely rude in all practical details, being in principle the same as in the Catalan process. Although steel is made by the decarburisation of cast iron, I have never come across any case of the indirect production of wrought iron by the removal of carbon, as in the refining and puddling of European 'pig' iron. The adoption of the direct process, whether accidental or not, is certainly not without its advantages, and, taking into consideration the material at the disposal of the Native worker, is perhaps preferable to the preliminary production of highly carburised 'pigs' although, on the contrary, he suffers from heterogeneity of product. Iron ore is so very abundant that he may well despise the addition of fluxes; and the highly ferriferous and basic

IRON: PRODUCTION. MADRAS: slag which consequently results has several advantages: (1) It aids in the removal of phosphorus when that element is present in the ore, or, as is sometimes the case, in the charcoal used. (2) The fusibility of the slag dispenses with the necessity of a high temperature for its removal, and thus there is an economy of fuel—the most important of all considerations—and at the same time a safeguard against carburisation. The scouring effect of basic slags on the furnace is quite immaterial to the Native, whose entire 'plant' might be purchased for a few annas, and who breaks down a considerable part of the structure at each operation of smelting a few pounds. As they use neither mineral coal nor pyritous ores, there is no fear of the introduction of sulphur. Neither the despised *pariah* nor the prouder but equally ignorant caste-man is aware that his ancestors and himself have been for so long a time working a combination of conditions which are comparatively new to Western civilisation, and only explained by the recent developments of chemical science."

The results obtained at the Research Department of the Imperial Institute, published in this Review for last year, show a considerable range in the value of the Indian iron ores represented by the 20 samples examined. Out of six, however, from Kanjamalai, four contained over 63 per cent. of available iron, the other two 36·44 and 35·73, respectively.

NATIVE STATES. 82. *NATIVE STATES.*—It will be seen from Statement I. (*page 68*) that the States of the Central Indian Agency return their production as 1,771 tons or a decrease of 33·24 per cent. from that of 1895, and on the average for the three previous years of 24·15 per cent. Doubtless this is due as much to greater accuracy in tabulation as to any such decrease in production. The supply was obtained chiefly from Sabaigarh (in Gwalior) and Bijawar and Chhatarpur in Bundelkhand. Rajputana showed a slight increase from 774 tons in 1894 to 855 tons in 1895 or 9·47 per cent. In 1896 the yield from all the mines in this State fell to 632 tons, valued at ₹15,470. The supply is mainly obtained from Ulwar, Meywar and Bandwara.

The most noticeable feature of the iron ore returns of Native States in 1895 was the very greatly enhanced production of Mysore, namely, 1,335 tons or an expansion of 37·35 per cent., but during the year under review the outturn has been reduced by 16·17 per cent.

XV.—FOREIGN TRADE IN IRON AND IRON MANUFACTURES.

TRADE. IMPERIAL. 83. As having a distinct bearing on the future prospects of the Indian indigenous iron industries, it may be useful to give some statistics of the foreign traffic in iron and iron manufactures:—

Imports of Iron and Iron Manufactures.

Description of Article.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.
	₹	₹	₹	₹	₹
Iron, wrought and unwrought	2,55,59,937	2,73,58,470	2,69,34,722	2,49,31,251	3,07,50,733
Steel	48,36,813	41,34,884	65,00,891	61,23,621	1,08,86,924
Hardware and Cutlery *	1,34,79,007	1,34,12,774	1,42,45,653	1,45,18,428	1,52,43,815
Machinery and Millwork	2,18,00,188	2,47,28,351	2,60,70,281	2,55,60,513	3,32,09,668
Railway plant	2,50,54,709	2,32,19,895	2,33,45,628	2,80,31,850	3,54,01,188
Total	9,07,30,654	9,29,04,374	9,70,97,175	9,91,65,663	12,54,92,328

* The figures of hardware and cutlery include electroplate which, strictly speaking, should not appear under iron.

Increased demand for Steel. 84. Last year's review quoted a passage from Mr. J. E. O'Conor's Review of the Trade of British India for 1894-95 on the subject of Iron and Steel. It seems desirable, on the same lines, to exhibit the present position of the trade in these articles. The following were the imports during the past ten years:—

	Iron. Cwt.		*Steel.* Cwt.
1886-87	3,280,389	1886-87	349,317
1887-88	4,321,587	1887-88	420,927
1888-89	4,002,793	1888-89	542,388
1889-90	3,608,405	1889-90	468,396
1890-91	3,876,556	1890-91	715,465
1891-92	3,680,489	1891-92	773,036
1892-93	3,596,239	1892-93	621,556
1893-94	3,709,617	1893-94	1,039,819
1894-95	3,250,403	1894-95	905,333
1895-96	4,000,246	1895-96	1,702,253

It will be seen that the imports of iron improved very considerably, still they were less than in 1887-88, and as Mr. O'Conor says in his review for 1895-96, the trade is non-progressive.

Turning now to the returns of the trade in steel it will be seen that last year's imports are the highest on record and that they are 88·02 per cent. in excess of those during the previous year and 63·70 per cent. in excess of the imports of 1893-94.

The table which will be found below (paragraph 85) reveals the fact that the supply drawn from the United Kingdom was 92·17 per cent. in excess of the previous year's imports and that the lowest annual supply drawn from the United Kingdom, shown in the table, was in 1883-84 when the imports stood at 240,149 cwt., last year's figure thus represented an expansion of 195·89 per cent. on the amount obtained 13 years ago. An even more notable state of affairs, however, is the expansion of the traffic with Belgium. The imports from that country in 1883-84 were 10,981 cwt. of steel and last year 936,498 cwt. or an expansion of 8,428·34 per cent.

The following are the principal forms in which iron and steel are imported:—

Chief items of Iron and Steel Imports.

Iron.	1893-94.	1894-95.	1895-96.
	Cwt.	Cwt.	Cwt.
Bars	1,047,941	543,915	593,426
Galvanised	489,415	539,943	726,430
Sheets and plates (including tinned plates)	461,041	436,957*	561,887
Pipes and tubes	443,239	380,975	383,771
Angle, bolt, and rod	406,601	525,504	757,795
Beams, pillars, girders, and bridgework	256,679	271,168	244,774
Pig	147,724	158,739	201,057
Nails, screws, and rivets	144,733	143,599	211,355
Hoop	90,612	79,174	92,394

Steel.	1893-94.	1894-95.	1895-96.
	Cwt.	Cwt.	Cwt.
Bars	502,798	337,120	598,943
Sheets and plates	204,281	149,867	321,511
Hoop	194,674	165,048	223,536
Cast	16,191	8,178	8,516

Decline of British supplies.

85. Belgium and Germany continue to compete actively in India with iron and steel of British manufacture.

The returns of last year show a satisfactory expansion, however, of the demand for British Iron and Steel with a decrease in that from Germany.

Year.	From United Kingdom.		From Belgium.		From Germany.		From Other Countries.	
	Iron.	Steel.	Iron.	Steel.	Iron.	Steel.	Iron.	Steel.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
1883-84	3,473,619	240,149	86,657	10,981	9,411	1,609	13,975	687
1884-85	3,423,559	263,433	165,488	24,287	5,209	1,400	8,020	808
1885-86	3,322,511	255,871	152,069	20,629	4,146	1,850	14,493	438
1886-87	3,102,856	327,744	162,043	19,240	3,922	2,154	11,568	179
1887-88	4,077,292	372,824	188,584	42,913	8,148	3,283	47,563	1,907
1888-89	3,715,081	456,550	262,436	77,976	11,928	7,063	13,348	799
1889-90	2,983,080	385,916	606,544	66,375	5,425	16,099	13,356	6
1890-91	3,306,381	462,671	536,076	164,874	13,134	76,235	20,965	1,685
1891-92	2,859,753	347,816	776,328	301,573	28,559	123,086	15,849	561
1892-93	2,382,578	270,751	1,153,411	283,817	34,727	66,712	25,523	276
1893-94	2,320,839	420,158	1,223,332	518,395	102,334	100,188	63,112	1,078
1894-95	1,956,721	369,753	1,176,179	448,091	75,264	84,083	42,239	3,406
1895-96	2,479,453	710,581	1,377,754	936,498	50,491	52,753	92,548	2,421

* Of which 79,000 cwt. represent tinned plates.

IRON: TRADE.

86. The exports of iron and iron manufactures from India to foreign countries are not important. The following figures represent the value of these exports during the past five years:—

IMPERIAL: Indian Exports to Foreign Countries.

Exports of Iron and Manufactures thereof (Indian Produce and Manufacture).

Description of Article.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.
	£	£	£	£	£
Iron, wrought and unwrought	86,963	97,620	80,056	69,228	93,581
Steel	...	...	...	...	...
Hardware and Cutlery *	109,951	99,078	84,042	134,324	190,485
Machinery and Millwork	1,246	2,940	540	6,610	1,269
Railway plant	...	...	...	...	...
Total	198,160	199,638	164,638	210,162	285,335

* See footnote, page 28, para. 83.

PROVINCIAL.

XIV.—INTERNAL TRADE IN IRON.

87. ***RAIL AND RIVER-BORNE TRADE.***—As customary in other cases, the subject of Internal Trade practically resolves itself into a criticism of the figures shown under rail and river-borne traffic and in the returns of coastwise trade. The details of local transactions passing by road, from the hill tribes who collect the ore, to the village blacksmith, are practically beyond the scope of this review. We may speculate as to the possible amounts so used up, but we can procure no statistics that could be regarded as trustworthy until the smelting of ore assumes the proportions of furnaces and foundries. With an inexhaustible supply of ore it is somewhat significant that so little progress has been made in this direction.

The following analytical statement may be given of the rail-borne transactions returned under the heading of iron during the past five years. These show the imports; but as the exports of one province are imported by another or others, it is perhaps unnecessary in the case of iron to show side by side the exports:—

PROVINCIAL: Rail and River.

Rail-borne Imports of Iron by the Provinces, Native States and Chief Port Towns, during the five years 1891–96.

	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.
British Provinces. (*Excluding Chief Seaports.*)	Tons.	Tons.	Tons.	Tons.	Tons.
Bengal	50,211	50,348	47,531	41,846	39,000
Bombay	31,239	33,342	36,390	35,398	36,573
Sind	2,851	1,035	1,966	1,357	5,370
Madras	19,791	27,489	23,925	17,006	18,534
North-West Provinces and Oudh	36,405	48,661	55,794	26,841	30,800
Panjab	36,407	28,865	27,616	29,881	33,763
Central Provinces	10,607	13,825	8,522	8,419	6,295
Berar	4,924	5,511	4,666	3,759	4,185
Assam	7,054	7,870	7,303	6,769	10,450
Total	199,489	216,946	213,713	171,276	184,970
Native States.					
Rajputana and Central India	13,577	12,839	10,245	9,208	9,874
Nizám's Territory	4,219	4,154	5,071	10,490	5,458
Mysore	7,949	8,511	10,487	8,466	15,054
Total	25,745	25,504	25,803	28,164	30,386
Chief Seaports.					
Calcutta	5,612	7,771	7,668	4,614	5,292
Bombay	2,309	1,793	816	1,445	1,025
Karachi	441	319	262	170	221
Madras ports	5,201	3,371	3,684	1,657	2,163
Total	13,554	13,254	12,430	7,886	8,701
Grand Total	238,788	255,704	251,946	207,326	224,057

In the Statement in the Appendix (*pages 80-83*) full details of the figures for last year are given. It will there be seen that Bengal heads the list of importing provinces, having last year secured 39,000 tons of iron. By far the most important item of that supply appears as an export from Calcutta. Next in importance comes the Presidency of Bombay with the total imports 36,573 tons, of which, as in the case of Bengal, the major portion was derived from the port town of Bombay. In both these cases, therefore, it may be assumed these figures indicate mainly, if not entirely, supplies drawn from the foreign imports Following Bombay usually comes the North-West Provinces with last year an import of 30,800 tons fully one-half of which was derived from Calcutta, the balance from Bombay, Panjab, Karachi, Bengal, Central India and the Central Provinces. In this case also the supplies obtained from Calcutta, Bombay and Karachi may be accepted as foreign iron. The Panjab received 33,763 tons, procured almost entirely from Karachi. Madras stands as the next in order of importance as a receiving province, *viz.*, 18,534 tons. Of that amount Madras port furnished nearly the whole, the balance being derived from Bombay and Mysore.

Port towns supply Foreign iron.

We thus learn from the study of the rail-borne imports and exports that during the year 1895-96 the chief port towns of India exported to their adjacent provinces 193,787 tons of iron. The imports from foreign countries of iron and steel (*see page 28*) came to 285,124 tons being 4,000,246 cwt. of iron and 1,702,253 cwt. of steel. These figures may, therefore, be placed alongside of the reported production of the Barakar Iron Works, *viz.*, 17,455 tons as denoting the present necessities of this country and the extent to which these are met by local production. And the returns given as iron by no means convey a complete conception of the future possibilities of this industry. For that purpose it is necessary to take into consideration the facts brought out by the table of foreign imports (*page 28*) of iron and iron manufactures which last year were valued at ₹12,54,92,328. From the imports of iron manufactures alone, a continuous supply is created of old and scrap iron, which is being more and more utilized by the indigenous industries.

88. ***COASTING TRADE IN IRON.***—By way of completing this statement of India's trade in Iron it is only necessary to give here some particulars of the amount of foreign and Indian iron that is distributed throughout the country by means of the coastwise shipping :

Coastwise.

Coastwise Trade in Iron—Imports.

Year.	Description.	Into Bengal.	Into Bombay.	Into Sind.	Into Madras.	Into Burma.	Total.
		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1891-92	Indian	178	1,112	17	196	64	1,567
	Foreign	3,779	4,920	1,677	6,154	1,914	18,444
1892-93	Indian	98	813	19	194	70	1,194
	Foreign	3,962	4,332	812	5,302	2,674	17,082
1893-94	Indian	70	606	7	336	34	1,053
	Foreign	990	4,559	955	5,163	2,117	13,784
1894-95	Indian	109	584	25	257	62	1,037
	Foreign	2,066	4,295	1,003	3,871	2,095	13,330
1895-96	Indian	97	409	15	153	218	892
	Foreign	6,668	3,768	1,414	4,568	1,982	18,400

Coastwise Trade in Iron—Exports.

Year.	Description.	From Bengal.	From Bombay.	From Sind.	From Madras.	From Burma.	Total.
		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1891-92	Indian	859	856	3	32	3	1,753
	Foreign	1,703	16,192	325	3,367	1,658	23,245
1892-93	Indian	549	895	57	27	5	1,533
	Foreign	2,189	14,592	224	1,831	2,083	20,919
1893-94	Indian	605	1,342	1	29	2	1,979
	Foreign	1,978	18,998	247	827	1,762	23,812
1894-95	Indian	464	1,183	32	163	11	1,853
	Foreign	2,069	13,784	243	361	1,402	17,859
1895-96	Indian	196	766	17	52	25	1,056
	Foreign	1,382	18,754	310	530	1,746	22,722

PETROLEUM:
PRODUCTION.
(Correspondence File No. 173.)

IV.—PETROLEUM (*Milti-ka-tel, Hind.*).

XVII.—PRODUCTION OF PETROLEUM IN INDIA.

89. The provinces of India that produce Petroleum are Burma, Assam, the Panjab and Baluchistan. In the last mentioned region production may, however, be said to have ceased since operations have been entirely discontinued. In the Panjab the production last year was 2,364 gallons or 51·53 per cent. more than in 1895 and 37·60 per cent. more than the average of the past three years. The major portion of the Panjab oil was raised at Rawalpindi, the balance of 720 gallons was obtained from Banna and used in the Railway Engineering Department.

90. ***BURMA.***—It is stated the oil has been obtained in this province for the past 2,000 years. The production last year (*page 69*) was **14,816,000 gallons** or an increased production of **14·18 per cent.** on the previous year and **30·06 per cent.** on that of the average of the past three years. This is certainly a very satisfactory result and if a continuous supply and expansion, such as that secured last year, can be maintained, the industry may be regarded as exceedingly prosperous. The increased output is said to be due to some extent to new operations. It may be localised as 12,516,430 gallons from Mágwe district, 2,117,728 gallons from Pokokku district, 115,312 gallons from the Kyaukpyu district, and 66,530 gallons from Akyab.

91. ***ASSAM.***—The Officiating Secretary to the Chief Commissioner in forwarding to me the annual statement makes the following remarks under the head of petroleum from Lakhimpur:—"The increase in quantity and total value, as compared with the preceding year, is due to the extension of the operations of the Assam Railway and Trading Company which completed its refinery during the year. The Assam Oil Syndicate which extracted no oil in 1895 had a small output in 1896."

The Digboi field in Assam is being steadily exploited. Ten bore holes are yielding oil and nine more have been struck at Makum. The capital expenditure at Digboi and Makum is now nearly 11½ lakhs, and more money will be spent as the industry progresses.

There is thus very little to comment, on the Indian source of Petroleum, in addition to what will be found in last year's review. Following the system pursued with salt, coal and iron an effort may, however, be made to exhibit last year's returns of the trade in petroleum and kerosine oil.

TRADE:

XVIII.—PROSPECTS OF INDIAN PETROLEUM.

92. If it be found possible to produce this oil at paying rates and in sufficient quantity, the home market would be almost limitless. The consumption of mineral oil in India is increasing with marvellous rapidity. The imports of foreign mineral oils rose from a valuation of ₹5,98,797 in 1870-71 to ₹48,70,580 in 1880-81 and to ₹85,18,279 in 1885-86.

Foreign Imports.

93. The FOREIGN IMPORTS during the five years ending 1895-96 were as follows:—

Imports of Kerosine and Mineral Oils.

YEARS.	Gallons.	₹
1891-92 . . .	58,109,283	2,36,81,495
1892-93 . . .	67,085,968	2,69,02,640
1893-94 . . .	86,608,568	3,27,55,852
1894-95 . . .	53,441,425	2,12,29,994
1895-96 . . .	66,648,001	2,96,74,004

It will thus be seen that last year manifested an expansion in imports that came to **24·71 per cent.** on the quantity and 39·77 per cent. on the value as compared with the imports of 1894-95.

PROVINCIAL.

XIX.—INTERNAL TRAFFIC IN PETROLEUM.

94. From the analytical Statement shown in the Appendix (*pages 84-87*) it will be seen that **24,709,600 gallons** of oil were carried on the railways and rivers of India during the year. Bengal was the largest importing province, having taken **7,672,544 gallons**, of which practically the whole was received from Calcutta. After Bengal the North-West Provinces and Oudh would appear to be the most important province, the imports of which were **3,923,280 gallons**, of which the Bengal Province, and not Calcutta, was the chief source of supply. In 1895-96, Bombay would appear to have been the third most important receiving province. Assam may be spoken of as fourth with 1,988,600 gallons derived exclusively from Bengal and Calcutta. The Panjab, fifth in order of demands, 1,935,848 gallons, the supply being derived mainly from Bengal and Karachi. It is perhaps hardly necessary to mention other particulars, except that the exporting centres are as follows:—Calcutta, 8,934,008 gallons; Bombay port town, 4,671,472 gallons; Madras, 2,286,112 gallons; and Karachi, 943,840 gallons.

Coastwise Traffic in Kerosine Oil and other Mineral Oils.

Imports.

95. By way of concluding this statement of the Indian trade in kerosine and other mineral oils, it is only necessary to give a few details of the coastwise transactions :—

Imports.

Year.	Description.		Into Bengal.	Into Bombay.	Into Sind.	Into Madras.	Into Burma.	Total Imports.
			Gals.	Gals.	Gals.	Gals.	Gals.	Gals.
1891-92	Kerosine	Indian	21,017	...	...	3,034	...	24,051
	Ditto	Foreign	681,197	1,907,229	48,944	1,560,444	464,597	4,662,411
	Other kinds	Indian	1,131,112	5,352	...	11,716	254,268	1,402,448
	Ditto	Foreign	3,080	27	913	10,508	4,560	19,0888
1892-93	Kerosine	Indian	...	...	...	53,115	84,072	137,187
	Ditto	Foreign	652,810	3,144,367	43,886	1,898,697	509,894	6,249,654
	Other kinds	Indian	1,197,467	5,328	...	23,074	230,197	1,456,066
	Ditto	Foreign	2,229	780	503	16,252	10,190	29,954
1893-94	Kerosine	Indian	...	...	...	4,932	188,408	193,340
	Ditto	Foreign	619,094	3,421,391	394,672	2,756,085	442,436	7,633,678
	Other kinds	Indian	1,376,402	4,971	...	16,530	195,456	1,593,359
	Ditto	Foreign	4,579	408	4,486	27,300	8,385	45,158
1894-95	Kerosine	Indian	355	...	...	11,838	240,326	252,519
	Ditto	Foreign	303,123	3,663,583	420,608	1,657,117	387,621	6,432,052
	Other kinds	Indian	1,529,093	20,265	...	25,518	247,645	1,822,521
	Ditto	Foreign	11,308	713	789	31,591	9,327	53,728
1895-96	Kerosine	Indian	41,360	...	...	20,705	355,250	417,315
	Ditto	Foreign	639,276	2,962,546	601,252	1,570,378	390,339	6,163,791
	Other kinds	Indian	2,049,609	17,299	...	11,500	236,101	2,314,509
	Ditto	Foreign	3,994	2,318	775	48,744	10,067	65,898

Exports.

			From Bengal.	From Bombay.	From Sind.	From Madras.	From Burma.	Total Exports.
1891-92	Kerosine	Indian	2,867	...	...	4	...	2,871
	Ditto	Foreign	765,627	6,003,240	50,779	132,401	459,263	7,411,310
	Other kinds	Indian	5,045	...	...	...	1,430,580	1,435,625
	Ditto	Foreign	540	20,725	...	125	4,281	25,671
1892-93	Kerosine	Indian	364	...	...	224	171,679	172,267
	Ditto	Foreign	696,261	7,535,020	496,388	49,592	475,242	9,252,503
	Other kinds	Indian	3,500	...	...	...	1,456,103	1,459,603
	Ditto	Foreign	18,229	32,391	...	558	275	51,453
1893-94	Kerosine	Indian	...	...	...	112	285,776	285,888
	Ditto	Foreign	760,202	10,525,863	31,489	74,594	405,395	11,797,543
	Other kinds	Indian	6,294	...	...	...	1,582,724	1,589,018
	Ditto	Foreign	8,225	61,261	47	76	3,388	72,997
1894-95	Kerosine	Indian	...	...	...	462	359,288	359,750
	Ditto	Foreign	359,581	8,310,399	114,489	142,231	358,744	9,285,444
	Other kinds	Indian	12,245	...	...	...	1,799,858	1,812,103
	Ditto	Foreign	26,842	68,895	750	97	2,093	98,677
1895-96	Kerosine	Indian	417	...	...	240	402,904	403,561
	Ditto	Foreign	1,126,777	7,853,567	39,476	137,287	352,329	9,509,436
	Other kinds	Indian	11,487	120	...	...	2,267,406	2,279,013
	Ditto	Foreign	50,225	78,818	10	39	4,735	133,827

In the above tables it will be observed that effort has been made to distinguish Indian from foreign Petroleum.

Costwise Traffic.

Statement II.

GOLD. ***MINERALS REGARDING WHICH DEFINITE STATISTICS CANNOT BE FURNISHED.***

96. The information called for under this heading was intended to amplify, and, if possible, bring up to date the returns published in previous Reviews regarding the more important minerals for which definite statistics are not available. The returns for the year 1896 in most cases affirm that nothing further can be said regarding the majority of these minerals than has already been published. It is not therefore, deemed expedient to attempt to express the information called for under the prescribed Statement II. in the form of Statistical Tables.

V.—GOLD (*Soná, Hind.*).

97. ***OCCURRENCE.***—Gold may be said to be found in the following localities :—

[Correspondence File No. 179.]

(1) MADRAS.—Madura, Coimbatore, Salem, Wynaad, Nilgiris, Travancore, Malabar, South Kanara, North Arcot and Bellary.

(2) MYSORE.—Kolar and Shimoga districts.

(3) NIZAM'S DOMINIONS.—Khammamett district, Topuldodi; Wandali (Raichur Doab).

(4) BENGAL.—Orissa, Midnapur, Bankura and Champarun districts; Chutia Nagpur (Lohardaga), (Udaipur), Manbhum, Singhbhum and Darjeeling.

(5) CENTRAL PROVINCES.—Chhattisgarh, Nagpur, Jabalpur divisions and Upper Godavari district.

(6) CENTRAL INDIA.—Ajmere-Merwara district.

(7) BOMBAY.—Dharwar, Belgaum, and Kaledgi districts and in Kathiawar.

(8) PANJAB.—Bannu, Peshawar, Hazara, Rawalpindi, Jhelum, Kangra, Amballa, Gurgaon and Hoshiarpur districts.

(9) NORTH-WEST PROVINCES.—Bijnor, Naini Tal, and Garhwal districts.

(10) ASSAM.—River-sand, especially of Lakhimpur district.

(11) BURMA.—Throughout the greater part of Lower Burma, especially in the river-sands of Tenasserim, and in Upper Burma in several districts, particularly in Katha. It also occurs in Ruby Mines district (in Momeik) and is obtained chiefly in the shape of dust in the dry nullahs in the Engdaing jungles. In Ye-u it is found in small quantities by washing in the Shwegyin and Tazê townships, also in Indaing township.

AURIFEROUS SAND-WASHING.

AURIFEROUS SAND-WASHING.

98. A definite statement of the annual production of gold for the whole of India cannot be furnished. Washing of auriferous beds takes place here and there all over the country. It is purely a native industry and it is therefore impossible to obtain statistics that could be advanced with any degree of assurance. The industry of gold-washing is, moreover, for the most part spasmodic, a sort of by-product with certain communities. The particulars furnished, for the year 1896, regarding gold-washing, may be said to perfect in some instances former returns, but more with the view of arriving at a figure of average annual outturn than of giving actual production.

Earnings.

In Burma the earnings during the working season have been put at 3 annas a day. Mysore sand-washings are said to have yielded 4 annas. In Chutia Nagpur (Udaipur State) the earnings have been put at 3 to 4 annas. In the Central Provinces (Jabalpur) at 4 annas, where also it is held that the goddess who makes the gold would leave the locality should at any time the earnings exceed that amount. In the Panjab (Peshawar) the daily rate is put at 2 annas or (Rawal Pindi) at 3 to 4 annas. But it should be recollected that in no locality in India can river-sand-washing be carried on throughout the year.

AURIFEROUS SAND-WASHING. Estimated Production.

99. The returns furnished of production from auriferous sands do not exceed 2,000 ounces for any year on record, and it is thus perhaps safe to assume, that a yield of 10,000 ounces would be the very highest admissible as the production of gold from river-washings. In the Census of 1891 there is a somewhat curious circumstance mentioned, namely, there were found to be 23,676 persons who made a living by washing the refuse of the goldsmiths' shops and recovering from it the minute particles of the precious metal that had been clipped or filed off in the ordinary course of work. But even were we to accept an estimate of 40,000 ounces of gold as annually produced by the washing of the sands of certain rivers, that amount would have to be regarded as insignificant when compared with the success that has attended gold mining in Mysore. In fact the chief interest in the gold-washings might be said to lie in the feasibility of their giving indications of the possibility of the extension of mining operations.

GOLD: TOTAL OUTTURN.

100. *OUTTURN.*—Before proceeding to review the available information on the subject of the Indian gold mines, it may be as well to record in this place the returns furnished by the Local Governments of the gold production for the year under review :—

GOLD PRODUCTION OF INDIA IN 1896.

Locality.	1894.		1895.		1896.	
	Oz.	₹	Oz.	₹	Oz.	₹
Madras . . .	961*	50,565	1,383	91,328	1,917	113,268
Mysore . . .	210,082	1,42,53,856	246,758	1,74,30,370	340,336	2,11,16,493
North-West Provinces .	57	3,702	54	3,473	81	4,917
Panjab	447*	22,612	447*	22,012	447*	22,012
Kashmir . . .	35	1,503	37	1,342§	27	1,180
Hyderabad . . .	99	2,970†	99	2,910†	Not stated.	
Burma	89‡	5,000	107‡	6,000	Not stated.	
Bengal	...	...	...	...	...	...
TOTAL .	211,770	1,43,40,208	248,885	1,75,58,035	342,808	2,12,58,470

* Originally returned as the production of 1891, and not subsequently modified; may be accepted as the mean annual production.

† The same quantity and value are given in 1895 as in 1894. It is explained that the quantities cannot be given as the working of the mines is given out on contract.

‡ Value only furnished: the quantity has been estimated on the ratio of previous quotations.

§ Value of 28 ounces.

The total production of gold in India thus expanded by 37·73 per cent. on the quantity and 21·07 per cent. on the value as compared with the previous year's returns. And if the comparison be carried back to 1892, it is found that last year's production manifested an expansion of 107·93 per cent.

Of the Gold Mining Companies the following facts have been gathered from the published reports to hand. The Directors of the Mysore Gold Mining Company at their seventeenth annual general meeting laid before the shareholders on 25th March 1897 a statement of the accounts of the Company. This exhibited a gross income of £426,684-8-10 which, after deducting working expenses and royalty, left a profit of £271,167-18-11. During the year the Company distributed three dividends amounting to £249,311 equal to 100 per cent. upon the nominal capital. The nominal capital stands at £250,000 and the shares issued 500,000. Since the creation of the Company in 1886 the total amount paid comes to £1,149,465-5-2.

The Champion Reef Gold Mining Company in their eighth report show the gold produced to have realized £302,500-2-6, thus giving a net profit of £154,067-13-6. The distribution during the year came to £148,500 or 67½ per cent.

The Ooregum Gold Mining Company of India at their annual general meeting declared gross receipts £246,645-8-11, the net profit on working of the mines £235,025, and this represented dividends at 30 per cent. on the ordinary shares and 40 per cent. on the preference shares. The capital of the Company is £145,000 ordinary and £120,000 preference. The total amount paid since 1891 came to £659,375.

The Nundydroog Company at their fourth ordinary general meeting held on the 31st March 1897 showed their income to have been £168,880-12-6, the disposable net profit £95,646-16-1, of which £71,500 was paid or 32½ per cent. upon the nominal capital. The Company existed from 1888 to 1892 under the name of The Nundydroog Gold Mining Company, Limited, and paid during these years £140,652-19-10. Since then it has been known as The Nundydroog Company, Limited, and has paid in dividends £185,221.

FOREIGN TRADE.

101. *FOREIGN TRADE.*—Before proceeding to discuss these very striking figures of production of gold it may perhaps be as well to furnish a statement of the Imports and Exports in the precious metal :—

The following table shows the Imports and Exports between India and foreign countries during the past five years, as also by way of comparison the figures for 1852 and 1872 :—

Table showing Total Imports and Exports of Gold.

YEAR.	IMPORTS.		EXPORTS.	
	Ounces.	Value in Rupees.	Ounces.	Value in Rupees.
1891-92 . .	709,102	4,11,89,291	285,454	1,70,51,369
1892-93 . .	272,442	1,78,17,891	726,925	4,59,44,720
1893-94 . .	474,635	3,14,65,300	378,399	2,50,52,840
1894-95 . .	236,873	1,75,62,800	926,843	6,73,03,740
1895-96 . .	695,055	5,02,92,692	372,432	2,50,33,168
Average of past five years .	477,621	3,16,65,594	538,010	3,60,77,167
1852-53 . .	...	£1,341,106	...	£168,805
1872-73 . .	...	£2,622,371	...	£79,000

GOLD.
FOREIGN TRADE: Exports.

The proportion of these marvellously increased exports of gold that can be attributed to the rapidly increasing production cannot of course be determined. With the fall in the value of silver the hoards of gold in India seem to have been drawn upon and the gold poured out of the country. This drain now gives however, what may be regarded as an indication of abatement. Last year the exports were 372,432 ounces valued at R2,50,33,168, or a decrease of 59·77 per cent. on the quantity and of 62·80 per cent. on the declared value of the previous year's exports.

GOLD MINING IN INDIA.

GOLD MINING. Mysore.

102. ***MYSORE GOLD MINES.***—Though very much more is heard of coal and coal-mining in India than of gold, the latter is of greater intrinsic value than the former. The declared value of the gold produced last year from the mines of Mysore and the adjacent British district in Madras came to R2,12,29,761 or, estimated at the rate of exchange of 1 shilling and 3 pence, to £1,328,654. As compared with that figure coal mining (last year's value £766,266) has very distinctly to take a second position. The potential value of coal is not, however, to be compared with that of gold. It gives vitality to the entire industries of the country, and thus secures a nation's well-being in place of the prosperity of a few owners and a limited number of employés. It has been thought desirable, however, to emphasise the importance and value of the Indian gold mines, since it is customary to find them relegated to a position of insignificance among the minor and undefined industries of the country. Through the pluck and perseverance of a few Englishman, gold-mining has within the past decade been raised to a position of great importance. On this subject Mr. James Grundy (*Report of the Inspection of mines in India during 1895*) while speaking of the Mysore mines says: "Gold-mining is being carried out on an extensive scale, and being done energetically. It finds employment for large numbers of men from many parts of India. A great quantity of materials is used, both Indian and foreign, such as coal, timber, explosives, iron, steel, steel-wire ropes, engines, boilers, other machinery, chemicals, oil, candles, antiseptics, paints, paper, food, clothing and drinks. The benefits arising from the use of all these materials, and many more, not named, reach far and wide; but they are most apparent in the adjoining and neighbouring villages and in the towns within easy reach of the mines."

"Such an industry, that converts a rocky jungle in to a hive filled with prosperous people, and whose prosperity radiates for miles around, and even reaches beyond the seas, deserves, and can reasonably claim, every encouragement in return." "The success of these mines appears to be almost solely due to the most dogged perseverance of Englishmen. The pioneers of these mines worked on and on, and spent their fortunes in proving the mines; they certainly worked and spent money in what was to them the sure and certain hope that the mines would provide their own reward." "The same thing is going on to-day in the same mining district; with the exception that they have all the previous and present work and known conditions and experience to guide them." "It is no secret that to out of the 14 mines visited are working at a regular heavy loss, and have been doing so for many years; and other companies have done the same as long as they could, and then had to retire with empty purses and blighted hopes. It is clear, therefore, that all the prosperity referred to comes from the few successful mines, and the greater number of mining companies who are finding work for the people, and spending money in the hope that they will some day be rewarded."

Description of mines.

103. ***POSITION AND CHARACTER OF THE MINES.***—"The present working (Mr. Grundy tells us) covers a tract of country almost exactly nine miles long. There are upwards of 62 shafts in use and a large number out of use. The depths of the shafts in use vary from about 30 feet to nearly 1,500 feet; several of them are considerably over 1,000 feet deep, and quite a large number over 500 feet." "The lodes run in a nearly north and south direction, consequently the whole of the mines are in a nearly north and south line. The most southerly mine is Mysore Reef; and this mine occupies the unique position of being the only mine included in the 'Kolar Gold Field' that is outside of the Mysore State."

"The most northerly workings are two prospecting mines belonging to the Gold Fields of Mysore Mining Company, and almost exactly nine miles in a straight line from the Mysore Reef Mine." The breadth of the field is comparatively small.

"Ladders as a means of ingress and egress is the universal rule; so that to get into, and out of, and about the mines during the 29 underground inspections, I travelled along 27,314 feet or nearly 5¼ miles of ladders in shafts, winzes, etc."

"There are about eleven distinct Mining Companies, nine Superintendents in charge, nineteen Mine Captains and underground foremen. The underground employés number 7,000; and 5,360 are ordinarily employed aboveground in addition to a large number of extraordinary employés." Mr. Grundy points out that the number of employés is about ⅓rd of the total number employed underground at all the 825 metalliferous mines of the United Kingdom. And he adds "much of this is due to the fact that the work done per man in India, is very little. But the accumulated work done at these mines, on any one day, is very great, for the mines are extensive, and are worked energetically."

Names of mines.

104. ***ENUMERATION OF THE MYSORE MINES.***—There are 12 mines in the Kolar district, 2 in the Hassan district and 1 in Mysore district. Of the former, 3 have been suspended, or are

only kept free from water, and of the latter 1 has not yet commenced to work. The relative importance of the other mines may be roughly indicated by the number of persons employed:—

Number of persons employed.

1.	The Mysore Gold Mining Company, Limited	2,650
2.	The Ooregaum Gold Mining Company, Limited	2,502
3.	The Champion Reef Gold Mining Company, Limited	2,346
4.	The Nundydroog Gold Mining Company, Limited	1,778
5.	The Balaghat Mysore Gold Mining Company, Limited	1,079
6.	The Kempinkote Gold Mining Company, Limited	415
7.	The Yerrakonda Gold Mining Company, Limited	340
8.	The Coromandel Gold Mining Company, Limited	320
9.	The Mysore West, and the Mysore Wynaad Consolidated Gold Mining Company, Limited	300
10.	The Nine Reefs Gold Mining Company, Limited	289
11.	The Oriental Gold Mining Company, Limited	234
12.	The Gold Field of Mysore Company, Limited	20
	TOTAL EMPLOYÉS	12,273

Of that number 7,117 work below ground.

Special Reports for 1895.

105. The following jottings may be given from the returns of mineral production during the year 1896, as showing the position of the industry of gold-washing or gold-mining in the province concerned:—

BENGAL.—There was one prospecting company working in the Manbhum district, but it was closed in January 1895. There are no mining companies at work in the Province. It has been suggested that systematic borings on scientific principle should be made in the gold bearing area of Chutia Nagpur before the mines are abandoned.

MADRAS.—The quantity of gold produced in this Presidency amounted to 1,917 ozs., valued at ₹1,13,268. It was obtained from the Kangundi Zemindary in the North Arcot district. According to Mr. Grundy's report for 1896, this gives employment to 285 persons.

MYSORE.—The information furnished by this State has been incorporated in the foregoing remarks. Mr. Grundy informs us in his last report that there are in all 18 mines in the State, and that these give employment for 12,348 persons.

BURMA.—At Kyaukpazat Katha District, Mr. Wright has erected a crushing-mill, has exposed 240 feet of reef and several shafts aggregating 241 feet in depth. Up to November 1895, the sale of gold totalled ₹6,000, and the number of persons employed is said to have been 113. Commenting on this mine, the official returns for 1896 state that for the purpose of gold-mining a tract of country ¼ of a mile square at Chaukpazat in the Mawnaing circle, Mawnaing township of the Katha district, was leased to Mr. C. M. P. Wright for a term of 30 years with effect from the 1st April 1895, at a yearly rental of ₹160 and a royalty of 5 per cent. on the saleable value of all gold obtained from the mines opened in the tract. The concession has recently been transferred to a Company. The mine or quartz reef is situated among low hills and is on the side of a steep slope. It is fully exposed to view and is about 80 yards long by 18 to 20 feet deep. A mill has been set up at a distance of about a mile from the mine with all necessary crushing apparatus and machinery. Several shafts have been sunk and work is being carried on with satisfactory results.

No women or children are employed either above or below ground. Burmans receive 8 annas a day wherever they work, above or below ground, at the mine, working 8½ to 9 hours, with half-an-hour midday rest and in the mill 10 hours with half-an-hour's rest. The mill mechanics and coolies work 12½ hours, with 1½ hours off during the day. Their wages are—driver ₹2-8 per diem; mill coolies 10 annas per diem; the latter receive in addition ₹5 per mensem for regular attendance and good conduct, which brings their wages up to 12½ annas per diem.

NORTH-WEST PROVINCES AND OUDH.—The only districts in which gold is found in any quantity in these provinces are Bijnor, Naini Tal and Garhwal. The estimated production in 1896 has been reported at 81 ozs., valued at ₹4,917. The general method of working this mineral is the washing of auriferous sands found in the beds of certain rivers, most notably Ramganga, Sukhar Sot, Phika and Khoh in the Nagina tahsil of Bijnor district.

PANJAB.—The average yield for the five years ending with 1890 at Bannu was ₹139, at Rawalpindi ₹206 and at Umballa ₹103.

KASHMIR.—Gold weighing 65 tolas 7 mashas from Skardu tahsil obtained by manual labour from sand at the bank of the Attock river and purchased at the rate of ₹18 per tola, value ₹1,180-8, annually recovered in revenue from Sbagar ilaka.

Grants and Licenses.

106. ***MINING GRANTS AND LICENSES.***—During the years 1889 to 1895, 35 grants and licenses for gold were issued, of which 14 were made in 1895: during 1896 the number issued was eight. These do not, however, include the licenses and grants issued by the Mysore Government.

PRECIOUS STONES.

AMBER.

[Correspondence File No. 200.]

VI.—AMBER (*Kah rubá, Hind.*).

107. ***OCCURRENCE.***—The only locality in India where Amber (a fossilised resin) is known to occur with any certainty is Myitkyina in the Hukong valley of the Bhamo district of Upper Burma. Since the annexation of that province the right to collect the duty on the mineral (5 per cent. *ad valorem*) has been sold by auction, together with that of Jade licenses.

108. ***OUTTURN.***—From the returns for 1896 it is learned that about 14 cwt., valued at R2,330, was extracted during the year. The outturn in 1894 was given as 87 lb., valued at R160. That for 1893 was stated to have been 549 cwt., valued at R2,900. In explanation of the variation in the price, the Deputy Commissioner remarked that in 1894 Amber was reported as obtained in one month only, whereas in 1893 the price varied from month to month, ranging from R2 to R20 per *viss*. He also affirmed, moreover, that the outturn for 1893 was doubtless incorrect, and that in this matter accuracy could not be expected in the returns. The price at the mines usually averages from R6 to R15 a *viss* (=3·65lb), and in Mandalay from R15 to R40. The yellow form is more rare than the red.

The Amber mines are worked by Kachins in a fitful and haphazard manner. In excavating, a shaft is sunk for 70 to 80 feet. Should the miners be fortunate enough to strike a vein, a side passage is made following the vein. At certain points lumps may be found which sometimes weigh as much as 1,000lb. These blocks of Amber are carefully removed, then sawn into the required shape and size.

109. ***MEDICINAL FORM.***—A variety of Amber called *Payinswe* used to be sold by the miners to the Chinese and taken to China, where it is used as a medicine.

BERYL.

[Correspondence File No. 189.]

VII.—BERYL—EMERALD (*Sabzá Panoon, Fastiki Kerási, Hind.*).

110. ***OCCURRENCE.***—This mineral is not alluded to in any of the reports obtained for the years 1894 to 1896. There is a famous old mine in the Coimbatore district of Madras Presidency, but it is not now worked. Beryls are reported to have been found at Viniambadi at northern base of the Nilgiris and at the foot of Lambton's Peak. [*Provincial Index (Madras) p. 20.*] The mineral is also found in several localities of the Panjab Himalaya, in Hazaribagh and Rajmahal in Bengal; near the Talchir coal-field of Orissa; and its occurrence in isolated positions throughout Rajputana has been repeatedly published but as yet no industry has been organised for its utilisation.

DIAMOND.

[Correspondence File No. 190.]

VIII.—DIAMOND (*Hira, Hind.*).

111. ***OCCURRENCE.***—Diamonds are said to have been found over six areas, *viz.* :—

(1) The Kistna valley side of the Deccan.
(2) The Madras Presidency, in the districts of Anantapur, Cuddapah, Kurnool and Godavari (Ellore).
(3) Chutia Nagpur in Bengal.
(4) The Central Provinces.
(5) Bundelkhand.
(6) Nizam's Dominions.

112. ***PARTICULARS OF MINING AND WASHING.***—While the gems actually do occur in the regions named, or have been reported as found, the industry of mining or washing for diamonds can hardly be said to be a flourishing one anywhere in India. The least important localities are Chutia Nagpur and the Central Provinces. Indeed, the reputation of diamonds in Chutia Nagpur may be regarded as highly doubtful. Diamonds were, however, formerly found in the neighbourhood of Hirakhoond in the Sambalpur district of the Central Provinces, where, in the days of Native rulers, operations were regularly prosecuted by damming and washing to search for the gems. The work was in the hands of professional diamond-washers known as *Jhirias*, who were liberally rewarded by grants of land for valuable finds.

A lease was granted by the Government to a syndicate of capitalists to search for diamonds in and near the Mahanadi above the town of Sambalpur, but its operations proved a failure. It is thought that diamonds may also be found in some of the crystal pits near Gorpur, Kobra, Dhundee Towa in the Betul district, and near Pattan in the Maltai tehsil of the same district, but no precise information is available.

The Hyderabad (Deccan) Company have carried on exploratory workings at certain localities in the Hyderabad State with partial success. From their workings over 3,000 diamonds have been obtained, but the stones being minute the proceeds obtained bore an unsatisfactory relation to the outlay incurred. The Company claim to have found old workings at certain places in the Ghanpura Circar, but the nature and capacity of these deposits remain to be exploited. The most recent returns of the Deccan Diamond workings are those of 1891, when the outturn for the Hyderabad State was put at 862¾ carats, valued at R15,530. From the Kistna valley side of the Deccan, the outturn for the two years 1888 and 1889 is recorded at 93 carats, valued at R108. Later operations have, however, increased this considerably. No statistics are obtainable from the other districts of the Madras Presidency. It is said that the supply from

the Ramalcotta washings has been unremunerative. Diamonds are met with near Banganapalle on 400 acres of land bordering the river, but there has been no industry for some years past. DIAMOND.

113. ***OUTPUT.***—The value of the diamonds extracted from the mines in Bundelkhand during the year 1893 was put at ₹20,549, and the report of the workings of 1894 shewed a production of 210¾ carats valued at ₹16,251-8-2. The corresponding figures for 1895 are 215 carats, valued at ₹19,506. The outturn for 1896 is reported at 321 carats, value ₹22,017. These diamonds are mostly obtained on the Panna plateau which is shared by several Native States. Occasionally a few stones are carried by the rains down to the plains and are there to be found by superficial washings. Production in Bundelkhand fluctuates very greatly. There are no State works and no capital expended, consequently a shaft once sunk has to be abandoned after the rains, from want of machinery to keep it open. The method of procedure is accordingly chiefly by superficial mines which are worked during the rains, since no water is available during the hot season.

IX.—GARNET (*Yaqut Chunni, Mehtab, Hind.*).

GARNET.
[Correspondence File No 192]

114. ***OCCURRENCE.***—The Garnet is common in various localities in India, those of Rajputana being the most important. In the Madras Presidency they occur in Vizagapatam, Godavari, Trichinopoly and Tinnevelly. *Prov. Index (Madras), page 22.* The stones found in South Canara, Nellore and Salem districts of the Madras Presidency have been pronounced as practically of no value and those of Monghyr district in Bengal are so much fractured, that they do not appear to be marketable.

Garnets are fairly abundant in Burma, as, for example, throughout the Mogok township, in the eastern and hilly portion of Twinnge township of the Ruby mines district, and also in parts of Momeik States.

115. ***TRADE IN GARNETS.***—The Garnets of Rajputana are, however, of considerable value. The stone is met with in the Bhilwara district of Meywar. The revenue derived in 1894 from this source was ₹3,549, in 1895 ₹1,775-15 and in 1896 ₹770-1. Returns showing quantity yielded during 1896 received as under—Kishengarh 32 maunds or say 23·5 cwts. obtained from 25 mines during the year 1896. Value not stated. The mines at Sarwar in the Kishengarh State, Rajputana, are being constantly worked and yield an average annual revenue of ₹2, 500. These mines are generally worked by the local Jogis and Malies, who are great experts at prospecting for Garnet mines. The Sarwar garnets are considered the best in Rajputana and are greatly prized, on account of their deep pink brilliant colour, for making jewellery, of which there is a flourishing industry at Sarwar. There are some fifteen manufactories of carbuncle jewellery worked by the local Muhammadans, who sell to the Mahajan traders, from whom the European firms and exporters receive their supplies.

X.—JADE and JADEITE (*Yashmi, Hind.*).

JADE
[Correspondence File No 188]

116. ***OCCURRENCE.***—A stone known in commerce as Jade is extensively worked in the Mogaung sub-division of the Bhamo district and in the Upper Chindwin and Katha districts of Upper Burma. Its colour varies from pearly grey to dark green. It is in very general demand throughout China. A variety highly prized by the Chinese is pale grey, with bright apple-green spots, clouds, and veins. A block of less than a cubic yard in size was some years ago valued in Rangoon at £10,000, and the Chinese are said to have offered £8,000 for it.

The Bhamo Jade-producing country is by far the most important. It may be described as a region lying between the 25th and 26th parallels of latitude, and shut in by the Chindwin and Mu rivers on the west and east, respectively. The mines now being worked are known as Tawmaw, Paungmo, Iku, Matiemmo, and Nienmo. The Tawmaw quarries have been worked for several years, but the stone is by no means exhausted. The Jade quarries of Katha district are situated about 12 miles north of the Mawhum hill, some 60 miles from the head-quarters of the district. The Jade extracted from these quarries is inferior to that produced in Bhamo, where the present mines yield a better class of stone than in 1892.

117. ***PRODUCTION.***—The outturn at Bhamo in 1894 was estimated at 727 cwt., valued at ₹1,15,091. The outturn in 1895 has been given as 37,513 pieces valued at ₹1,30,543. That in 1896 is stated to have been 2,990 cwt., value ₹1,50,341.* The industry is said to be flourishing. A royalty of 33⅓ per cent. is levied on all Jade-stone extracted in Upper Burma. The right to collect this duty, together with the duty on Amber, is sold annually by auction. The licensee for the year 1892, a Chinaman, purchased the privilege for ₹36,000.

A fine green stone, probably Jadeite or Jasper, is found at Mohgaon in the Sanson tahsil of the Chindwara district of the Central Provinces, and appears to have been worked at some remote period.

118. ***TOTAL INDIAN TRADE.***—The quantity of Jade-stone exported by sea during the year 1893-94 amounted to 2,270 cwt., valued at ₹4,34,650; the trade thus showed a decline of nearly one thousand cwt. on that of the year preceding. But in 1895 the exports were 2,540 cwt., valued at ₹4,53,062 consigned from Burma to the Straits Settlements. Last year (1895-96) the exports rose to 4,249 cwt., value ₹5,46,150, all from Burma and consigned mainly to the Straits Settlements.

119. ***False Jade.***—A considerable amount of stone known as False Jade (a form of serpentine) is annually imported into the Panjab from Afghanistan. It is said to be found near Kandahar and to be brought down the Indus to Attock on rafts floated with inflated skins. It is conveyed to Bhera in the Shahpur district, where it is manufactured into knife-handles. This stone is known as Sang-i-Yesham. It is cut by iron saws and water mixed with red sand and pounded emery (corundum, *kurund*).

XI.—QUARTZ (*Chakmak, Hind.*).

QUARTZ.
[Correspondence File No. 194.]

120. ***OCCURRENCE.***—This mineral, which includes rock-crystal, flint, amethyst, cornelian, agate bloodstone, chalcedony, chert jasper, onyx, opal, etc., occurs in the Monghyr district of Bengal, and is extremely common in the Hyderabad State.

On the subject of quartz in the Monghyr district, Messrs. Steven Ambler & Co., of Jamalpur, write as follows :—

"Quartz occurs running in regular veins parallel to the lines of bedding, and throughout the conditions are such as occur in gold-bearing quartz, and such as would warrant an exploration to search for that metal."

This mineral is also found in the Salem district of Madras, as veins of very pure quality, unstained by iron. The Elephant Rock in the lower slopes of Shevaroys is also a magnificent mass of pure white quartz. The stones found in Coorg are mainly used for metalling roads. Gold-bearing quartz occurs in the Kath district of Upper Burma.

Onyx (*Sang-i-Sulemani*, Hind.) are found plentifully in the crystal pits in the Betul district, and there is a band of coarse Onyx near Amerwara in the Chhindwara district.

Agate (*Yamni Akik*, Hind.), cornelian, etc., are found in the beds of the Narbada, Bhima, Godavari and Kistna rivers.

Rock crystal (*Billaur*, Hind.) occurs in the Patna Feudatory State in the Sambalpur district; there are some good specimens in the Nagpur museum.

121. ***INDUSTRIAL USE.***—A small industry in rock-crystal of different colours called "Vallam stone" is carried on at Trichinopoly and in the Palladam taluq of the Coimbatore district of the Madras Presidency, the stones being brought from Vallam in Tanjore. Spectacles and dolls are made out of them. The "Godavari pebbles," which were formerly eagerly sought after, are not now in demand, being most probably out of fashion. In Coorg quartz is used for metalling the roads.

The most important industry in quartz, or rather ***Cornelian*** (*Sang-i-akik*, Hind.), etc., is that which for centuries has existed in the Bombay Presidency, more especially at Cambay; the stones are brought from Rajkot and Rajpipla into Bombay, and a considerable trade is done in them. Mr. Grundy mentions there being four *Akik* quarries at Rajpipla. Broach is also another centre for this industry. Less important centres of lapidary work are those of Jabalpur and Banda.

XII.—RUBY (*Lal, Manick, Hind.*); SAPPHIRE (*Nilam., Hind.*); SPINEL and TOURMALINE.

RUBY.
[Correspondence File No. 189.]

122. ***OCCURRENCE.—Ruby.***—The chief Ruby Mines of Upper Burma are situated in the neighbourhood of Mogok and Kyatpyin, in the Ruby Mines district, and are worked by the Burma Ruby Mine Company, Limited, and by native workers. There are four regular mines that give employment to 1,048 persons. The Ruby Mines Company, Limited, have a capital of £300,000, and their outturn in 1895 was put at 56,108 carats, valued at ₹2,91,357. The expenses of the Company during 1896 are returned at ₹4,31,892 and the value of rubies yielded at ₹6,87,537. The provincial report from Burma for the year 1895 states that "it is known that many rubies have been found at Nanyaseik, but the people who find rubies are not anxious to tell their neighbours or the public. It is said that two rubies worth ₹5,000 each and one stone worth ₹10,000 were found, besides a large number of small stones." Rubies are still found occasionally by the alabaster workers of Sagyin.

Spinels and ***Sapphires*** are not intentionally worked for, but are often obtained in association with the Rubies. In the Ruby Mines district, Rubies, Spinels, Cat's-eyes, Sapphires, and inferior precious stones are found throughout the Mogaung township, near the villages of Wapyudaung, Kyaukgyi, and Yingan in the eastern and hilly portion of the Twinnge township, also near Sagadaung and Udintaung in the Momeik State. The principal ruby-bearing region, *i.e.*, that of Mogok and Kyatpyin, extends over an area of 66 square miles, but the tract in which the Ruby mines are now actually worked is about 45 square miles in extent. The mines are situated in a mountainous tract some 90 miles north-west of Mandalay and 50 miles by road east of Thabeikkyin on the Irrawaddy, at an elevation of 5,000 feet above the sea. The stones occur in small patches in the valleys or between the fissures of the rock, or on the surface soil of the hillsides.

Another ruby tract is that known as the Sagyin Ruby Mines, Mandalay. These are situated in a narrow range of hills rising from the plain of the Irrawaddy valley, 24 miles north of Mandalay, and 8 miles from Madaya. These mines are at present reserved by Government and are not being worked. So again Rubies are found in Bhamo in the Nanyaseik stone tract, but the extent of occurrence is not known. The production in 1894 is said to have been 26 tolas, valued at ₹6,750.

In India itself certain tracts of country are said to contain rubies, such as in the Salem district. The Collector of that district says, however, that garnets are often mistaken for rubies, and that, if there be rubies at all, they are not true rubies, but spinels. Rubies are reported to have been found at Viralimodos and Shoslasingamani. *Prov. Index* (*Madras*), *page 12.*

123. ***MINING*** and ***WASHING.***—In the Ruby Mines district the stones are obtained by asking pits through the superficial soil, until the stone-bearing stratum (*byon*) is reached. This occurs at

depths varying from 3 to 20 feet. The earth obtained from these pits is washed through sieves and the stones separated. RUBY.

The earth from between fissures of rock is similarly treated, except that, of course, pits are not required. The earth is simply dug out of the crevices and washed. The hillside deposits are worked by washing away the surface soil by means of streams of water diverted for that purpose. The stones are then obtained from the surrounding soil by the usual method of washing. Another process of securing rubies, and the one which is now principally employed by the Ruby Mines Company, is that of tunnelling into hills, in order to reach the fissures containing *byon*. The *byon* is dug out, conveyed to a washing station and the rubies separated.

124. It may easily, however, be understood that it must be more difficult to secure remunerative supplies of the stones now-a-days than in former years, since the more accessible deposits have been exhausted and the mines have to be abandoned at times, when the water during the monsoon rises in the tunnels. The revenue of the Ruby Mines under the Burmese Kings is said to have been about £12,000 to £15,000 a year.

125. These mines are situated in the Ruby Mines district of Upper Burma, but the term "mines" is almost a misnomer when applied to the excavations from which rubies are extracted. The principal mines are owned by the Burma Ruby Mines Company, Limited, and consist of large pits open to the air and of an average depth of 30 feet. There is practically no tunnelling or working underground. The other ruby mines in the district are worked by native miners. The majority are known as *twinlón* and consist of holes about 5 feet in diameter which are dug vertically downwards. They are open to the air and are worked by one man below, who extracts the matrix clay, and another man up above, who draws up the clay in a bucket. The rest of the ruby mines are either *myaws* or *lus*. A *myaw* is a seam of clay running as a rule between rocks and invariably exposed to the air and light, from which the clay is either washed by a continuous flow of water or extracted by hand. A *lu* consists of a narrow passage running between rocks often descending 100 feet or more into the bowels of the earth. These native mines are small and extend over a large tract of wild country. They are carried on by hereditary methods.* The native industry is, however, far from prosperous. Few stones have been found of late, and there is practically no market for any but stones of the finest water. The fees for ruby licenses for 1896 realized R49,246.

The Burma Ruby Mines Company's mines are situated in a mountainous tract, some 90 miles north-east of Mandalay and 50 miles by road east of Thabeitkyin on the Irrawaddy at an elevation of 5,000 feet above the sea. The mines have been leased to the Company for 14 years from the 1st of November 1896 at a yearly rent of R3,15,000 *plus* a share of the profits.

Women or children are not employed in the ruby mines. The Company pay their native coolies every fifth day at the rate of Re. 1 a day. Native owners pay on a similar principle, but usually arrange for lower rates and to give a share of the profits.

Work is carried on for 10 hours a day. The coolies belong for the most part to a race called Maingtha and come from China. European machinery is used for washing in the Company's mines which are carefully supervised by highly paid and well trained Europeans.

126. Myitkyina.—The industry at Nanyaseik is languishing, the specially rich parts having been out last season. Prospectors are waiting to see whether another rich ruby-bearing sediment is struck before taking out licenses.

127. ***Kashmir Sapphires.***—Recent returns are not forthcoming regarding the traffic in sapphires. It is stated that in 1889 these stones, to the value of R15,000, were derived from Kashmir. In a criticism on this remark, discrediting the Review for 1895, it was stated that "only the other day Kashmir State disposed of several lakhs of rupees worth" of sapphires. On representing the statement to the Durbar I have been informed that the valuable collection of stones emanated from a large stock which had been in the possession of the Durbar for many years past. Last year's report from Kashmir on that subject is as follows:—"A sapphire mine exists in the Padar Jaskar tahsil which once produced valuable sapphire stones, but its working has long since been abandoned owing to its yielding stones of extremely inferior quality which can scarcely be called sapphires" Mr. W. R. Lawrence (*The Valley of Kashmir, 1897*) speaks of the sapphire mines as having been accidentally discovered in 1882 but as being long since abandoned. Men who were in charge of the sapphire mines in Padare, he tells us, have spoken to me of other valuable minerals. Mr. La Touche while dealing with the economic geology of Kashmir, remarks, "Even the common minerals, coal and iron, are not found in any large quantity, and where they do occur are poor in quality. Accident may bring to light the presence of some of the rarer minerals, as in the case of the sapphires, but even the most energetic and intelligent prospector might spend years among the mountains before making such another discovery." Mr. Mallet tells us that "the rock in which the sapphires were discovered, which was doubtless a crystalline one, as the whole of the Zanskar range is composed of such, appears to have been decomposed and crumbly at the surface, so that the gems could be taken out like potatoes. Further in, the rock was more solid and they could only be extracted with the aid of tools. A very large quantity appears to have been obtained, and the first lots that were brought across the snow are said to have been sold for a mere trifle, owing to the ignorance of the carriers as to their value. Subsequently, however, when the fact that the stones were real sapphires was known, they rose in price to R100 per tola in the rough, and considerably more for really promising pieces."

RUBY.

128. *Tourmaline.*—Is generally Rubellite, good specimens being of a deep crimson but "flesh-red" examples having been found in Pegu. Occasionally also white specimens have been found among the black stones that come from the Shan States. The report furnished by the Government of Burma on the subject of Tourmaline for the year 1895 was as follows—Is found in Maingmaw, Môngmit State, and on the Mobyèchaung between Mogôk and Mainglôn. The present state of the industry is bad, due to a fall in market consequent on the late China-Japan war, the Chinese being the only buyers. Outturn during 1896 about 2½ cwt., valued at ₹57,750.

Green tourmaline has also been mentioned as occurring in the Hazaribagh district of Bengal and in the granite dykes traversing gneiss, in the bed of the Cauvery at Seringapatam. Yellow, brown and green tourmaline have been recorded in association with the sapphires of Kashmir and often also present in the rubellite beds of other localities.

129. ***Oriental Emeralds*** have also been found in the Ruby mines.

Besides the gem forms of this mineral, India is particularly rich in Corundum, for which see page 45.

MISCELLANEOUS MINERALS.

ALUM.

XIII.—ALUM (*Phitkari, Hind.*).

[Correspondence File No. 193.]

130. ***OCCURRENCE.***—Alum shales occur in several parts of India, but are more particularly worked at Madh in Cutch, at Kalabag and Kutki in the Panjab, and in Behar. In the Shikarpur district alum is said to be manufactured on the Kirthar range in large quantities and of fair quality. In 1867 the yearly outturn of Cutch alum was estimated at 294 tons, but after that time it fell off. About 44 tons of alum are made annually at Kalabag, and 367 tons at Kutki.

Aluminite occurs in veins in the shale underlying the coal seam at Chittidand in the Salt Range. It was discovered by Dr. Warth in 1886, and was found to consist of sulphate of alumina with traces of iron.

Alum is also found in the Ye-u district of Upper Burma, near Udaung in the Indaing township, but it is not worked.

131. ***TRADE.***—Alum is extensively employed throughout India as a mordant in dyeing, but particulars of the extent of the traffic are not procurable.

ANTIMONY.

XIV.—ANTIMONY (*Surma, Hind.*).

[Correspondence File No. 181.]

132. ***OCCURRENCE.***—Good lodes of Stibnite occur at Shigri in Lahoul and also in the Jhelum district of the Punjab. The Jhelum mines are annually leased by the District Forest Officer. There is also said to be one mine in pargana Bardi of Rewah in Central India. In the Madras Presidency small quantities are stated to occur in a few fields at *Latipadu* in Gumsur *taluk*, Ganjam district. *Prov. Index of Important Minerals (Madras), page 10.* Antimony is also met with in the Ye-u district of Upper Burma near Udaung in the Indaing township, but it is not worked. But perhaps the most hopeful deposits of antimony are those found in the Kyaukkaung tract of Tenasserim. On May 8th, 1894, Mr. J. H. Herrifield submitted a report on these Tenasserim deposits. "The Kyauk kaung, he says, is divided into two unequal portions of approximately 250 and 370 square miles, respectively. Of these, the smaller western portion belongs to us; the larger eastern to the Siamese." "Mr. Adam who in Antimony is an acknowledged expert, states that he considers the deposits within British territory as of immense value. He was originally brought out from Scotland by the Borneo Company to work their Antimony deposits in North Borneo." "I understand from him that the Stibnite (the commercial ore of antimony) here, as in Borneo, occurs in irregular deposits of a 'pocketty' nature, often massive and of great value, lining and filling fissures in the limestone in immediate junction with the newer states that overlie the limestone. The method of working is fossicking and poking about in likely localities till a run of payable ore is found, and blasting out the pockets usually in open-casts. Rarely, and then only in the very richest ground, is sinking or driving on any scale attempted." "It is considered cheaper to smelt on the spot and to ship the crude regulus (unrefined pig), the necessary plant can be erected at small cost."

133. ***ECONOMIC USES.***—"The principal commercial use of Antimony is in the manufacture of type-metal, for which the demand is enormous and steady; the market is consequently fairly regular and is not subject to the violent fluctuations that have so baneful an effect on tin and other fluctuating staples. Antimony also enters into the manufacture of gong-metal, speculum metal, certain classes of gun-metal, bell-metal, and bronze-alloys."

ASBESTOS.

XV.—ASBESTOS "*Shankha palita, Mar.* (=wick made of shells)."

[Correspondence File No. 183.]

134. ***OCCURRENCE.***—There is no recognised industry in collecting and utilising Indian Asbestos. The mineral is reported to occur in Afghanistan, the Panjab, Garhwal, Bhopawar (in Central India), in Chutia Nagpur and in Mysore. In 1894, 5 maunds, valued at ₹40, and in 1895, 6 cwt., valued at ₹48, were procured from Hassan in Mysore. The same figures, 6 cwt., value ₹48, have been returned as the production during 1896.

No true asbestos, but a fibrous form of Serpentine, is often associated with the magnesite veins of the so-called "Chalk" Hills north of Salem town.

XVI.—BORAX (*Suhágá, Hind.*).

135. ***OCCURRENCE.***—This mineral occurs on the margins of certain lakes in Tibet itself or just within the Panjab frontier of Tibet and in Jummu. In 1855, an attempt was made to develop the trade in native borax. At that time England's imports were 1,100 tons, of which, owing to a monopoly that existed in the trade, only 300 to 600 tons were produced in India. An enquiry was then set on foot, which, although resulting in many interesting facts on the subject being made known, was not successful in materially improving the trade.

(*1st*) ***Puga Borax.***—The Pugá borax is obtained from the small valley of that name. The valley was visited by Captain W. C. Hay, who estimated the entire produce at 20,000 *kutcha* maunds (1 *kutcha* maund—32lb). Most of it goes *viá* Rámpúr to the lower hills about Subáthu, Bhaji, etc., where in winter it is refined by the carriers, and thus becomes the borax of commerce. At Jagadri in the plains there are extensive refineries that receive nearly all the Pugá borax. The article is then carried down the rivers Jumna and Ganges, but it is doubtful if it reaches England in any quantity. Borax of a superior quality, in fact nearly pure, is found near Rudokh,—a portion of Tibet subject to China. It is also believed that if the jealousy of the sellers could be broken down, other borax-yielding districts would be discovered.

(*2nd*) ***The region of Indian Borax*** may be said to commence in the west, at the valley of Pugá in Ladak, passing east to the lakes of Rudokh. Along this tract of country and extending considerably to the east, a chain of salt lakes occurs, most of which in all probability afford borax. In a report to hand it is stated that during 1896 Kashmir State produced 1,435 maunds, valued at ₹3,755 or ₹2-13-3 per maund.

To the south of Lhasa, at the Yamdok Cho, borax is known to have been collected from time immemorial. In Tartary holes are dug in the arid soil of many parts of the deserts; within these, native borax collects and is periodically gathered.

The process of purification has been described thus:—

PURIFICATION of BORAX.—"The borax is pounded and placed in shallow tubes, and then covered with water to the extent of a few inches; to this is added a solution of about two pounds of lime (dissolved in two parts of water) for every ten maunds (820 pounds) of borax, and the whole mass is well stirred every six hours. Next day it is drained on sieves or cloth, and after this is again dissolved in 2½ times its weight of boiling water, and about sixteen pounds of lime added for the above quantity. It is then filtered, evaporation takes place, and subsequently it is crystallized in funnel-shaped vessels, usually of *konsa*, an alloy of copper and zinc or lead. The loss in weight is about 20 per cent."

136. ***TRADE IN BORAX.***—Borax is chiefly imported into India through the North-West and the Panjab Himalaya. The following statement shows the principal ***Imports*** for the years 1883-84, 1893-94, 1894-95 and 1895-96:—

Imports from Tibet into the North-West Provinces.

Years.	Weight in cwt.	₹
1883-84	24,873	3,37,938
1893-94	14,850	1,57,548
1894-95	13,710	1,72,167
1895-96	13,552	1,62,480

Imports from Ladak and Tibet into the Panjab.

Years.		Weight in cwt.	₹
1883-84	Ladak	6,676	73,081
	Tibet	2,452	20,028
	Total	9,129	93,109
1893-94	Ladak	1,148	10,588
	Tibet	968	7,908
	Total	2,116	18,496
1894-95	Ladak	1,327	14,197
	Tibet	978	10,648
	Total	2,305	24,845
1895-96	Ladak	1,935	21,072
	Tibet	886	8,435
	Total	2,821	29,507

BORAX.

Exports.—In India the trade in borax, judging by the returns available, may be said to be decreasing; the figures returned of the exports of this article to foreign countries also show a marked decline. But the decline may be taken as a natural consequence of the discovery of extensive beds of borax in America, and of the greatly extended trade in the artificially prepared article. It has, however, been inferred that, although India cannot hope to compete in the foreign trade, her trans-frontier imports will always be of importance, owing to the considerable internal consumption. The article is inferior to that of Tuscany or California, and the transit charges across the Himálaya to the coast are prohibitive.

Analysis of the Foreign Export Trade in Borax for 1895-96 as compared with that for 1894-95, 1893-94 and 1883-84.

Province from which exported.	1893-94.		1894-95.		1895-96.		Country to which exported.	1893-94.		1894-95.		1895-96.	
	Cwt.	R	Cwt.	R	Cwt.	R		Cwt.	R	Cwt.	R	Cwt.	R
Bengal . .	7,017	1,20,323	7,716	1,35,998	6,583	1,17,359	United Kingdom .	4,595	74,616	2,645	41,006	1,888	30,263
Bombay . .	213	5,148	154	3,580	117	2,779	Arabia . .	26	667	76	1,798	21	534
Madras . .	...	...	10	730	...	...	Hong-Kong . .	2,086	40,171	4,581	85,509	4,157	78,261
							Straits Settlements	319	5,375	327	6,017	551	9,107
							Turkey in Asia .	152	3,666	38	832	27	608
							Other Countries .	52	973	213	4,246	56	1,365
TOTAL .	7,230	1,25,471	7,880	1,39,408	6,700	1,20,138	TOTAL .	7,230	1,25,471	7,880	1,39,408	6,700	1,20,138

COPPER.
[Correspondence File No. 175.]

XVII.—COPPER ORES (*Támba, Támá, Hind.*).

137. *OCCURRENCE.*—These ores are widely distributed. They occur in Singhbhum and Dalbhum, and are said to be found also in the Banka division of the Bhagalpur district, Bengal; but mines in the latter locality do not appear to have ever been opened. Azurite and other carbonates of copper are found at Kakwara in South Bhagalpur.

Under the direction of Hyder Ali, excavations were made on the lower ridge of the copper mountain range five or six miles west of Bellary, but they were speedily given up. Lieutenant Newbold, in 1840, also noticed similar copper ores in the Cuddapah, Dharwar, and Nellore Districts. There were seven mines in the latter district and were known to exist as far back as 1564. The ores contained from 31·7 to 68·5 per cent. of hydrated carbonate of copper and from the analysis of specimens of slags found near the old smelting furnaces, it would seem that the rude processes of extraction used in olden times were effectual in completely separating the metal. Old mines are also stated to exist in the Kistna and Kurnool districts. In Trichinopoly traces of copper have been found—*Provincial Index (Madras), pages 10-11.*

Copper ores occur in several places in the Chanda district of the Central Provinces, and there are at least three places in the Mul tahsil, where mines were worked in ancient times. These ores are also found near Birman in the Narsinghpur district and Gosalpur and Khetola in the Jabalpur district, but in the latter place it has not been worked as an industry. In Rajputana, copper ores are found in several of the independent States, and in the British district of Ajmir, where mining was practised on a large scale, but is now almost extinct. There is said to be one copper mine in Rewah State, Central India. Unsuccessful attempts have been made to work the copper ores of Kumaon, Garhwal, the Western Duars, and the Darjeeling districts. Copper mines are said to exist in Hyderabad, but valuable ores in any quantity have not as yet been discovered. In Burma, copper ores are believed to exist in the hills east of Kyannhyat, Ruby Mines district; last year Messrs. Hegt. & Co. were reported to have applied for a license to prospect in that locality, but in the returns of 1895 no further mention is made of this fact.

138. *OUTTURN IN BENGAL.*—Statistics regarding production of copper in 1895 are not available. The outturn in Bengal during the year 1891 was estimated at 2,500 tons, valued at R1,32,500. In 1888 218 tons of refined copper were said to have been turned out. The industry of copper smelting has been dormant in India for many years, and may be said to have revived to any extent in two localities in Bengal only, *viz.*, Baragunda in Singhbhum and in Dalbhum, where a company is said to be working the ore.

Rajputana.—The following figures showing outturn during 1896 have been received—
Jaipur—Kishengarh.—

400 maunds or 14·6 tons, valued at ₹520, obtained from the Singhana mines.
200 maunds or 7·3 tons, valued at ₹320, obtained from the Khetri mines.
The ores are ground, then placed in water and the copper extracted and sold.

139. *TRADE.*—Some idea of the value to India of copper mines may be learned from the returns of the foreign trade. Last year India imported 471,824 cwt. of copper, valued at R2,08,99,352. The major portion (355,580 cwt.) came from the United Kingdom; Belgium being next in importance (54,149 cwt.) and after that Hongkong (30,374 cwt.). By far the largest portion of these imports usually goes to Bombay (301,177 cwt.). The trade fluctuates very considerably, the transactions of 1894-95 were the lowest during the past five years, and the highest of that term were in 1893-94, *viz.*, 591,109 cwt.

Mixed or *Yellow Metal* for sheathing purposes, constitutes a very distinct item in these imports, *viz.*, 226,804 cwt. in 1893-94, 179,261 cwt. in 1894-95, and 226,716 cwt. in 1895-96. The total imports in *Brass* were last year 10,718 cwt., valued at R6,00,728.

XVIII.—CORUNDUM (*Kurund, Hind.*).

140. ***OCCURRENCE.***—Corundum and Emery stone (Oxide of Aluminium) is very freely distributed among the crystalline rocks of Southern India, such as in the Travancore State, the Mysore State, Hyderabad (Kazipet), and in the districts of Coimbatore, Salem, Anantapur, North Arcot and South Canara of the Madras Presidency. Mr. C. S. Middlemiss of the Geological Survey has published several reports on the Corundum localities of Salem. These have already been noticed in previous reviews, but may be consulted in the Agricultural Ledger No. 16 of 1896 and in the Records of the Geological Survey, Volumes XXIX, Pt. 2, pp. 39—50, and XXX, Pt. 3, pp. 118—122.

In his Annual Report of the Geological Survey for 1896 Mr. R. D. Oldham, Officiating Director, reviews the results obtained during the past year's investigations into the subject of Corundum, in the following paragraphs :—

Concurrent with the purely geological survey, the special investigation of the corundum-bearing rocks has been actively carried on, and has resulted not only in the discovery of many new localities, but what is more important, of the fact that the corundum occurs in definite bands of rock which can be followed with almost the same certainty as a seam of coal. One such band—known as the Paparapatti band—has actually been traced continuously for a distance of 36 miles.

The preliminary survey being sufficiently advanced to render the commencement of exploratory workings desirable, with a view to testing the extent and richness of the corundum-bearing rock, arrangements were made with the Government of Madras for the carrying out of this work. Owing to the resignation of Mr. Anderson—who had been intended to take charge of this work—a modification of the original plans had to be made, and it was arranged that a series of excavations should be made by the Public Works Department, at places to be pointed out by Mr. Middlemiss. These excavations or quarries as they will be, are intended to show the thickness of the corundum-bearing bands, and whether they are continuous or occur as lenticular patches. A fair average sample of the rock extracted, of sufficient size to give a trustworthy estimate of the richness of the rock, is to be carefully cleaned by hand and the proportion of corundum to matrix determined by weighing. Samples of the cleaned corundum and of the rock will then be sent to the Secretary of State for submission to experts with reference to (1) the value of the cleaned product, and (2) the best means and probable cost of separation. Owing to the fact that each crystal of corundum is surrounded by a shell of felspar, from which it separates as readily as the kernel of a nut from its shell, there will be no difficulty about the mechanical separation of the corundum from its matrix, and the whole question of the possibility of working these deposits on an industrial basis will resolve itself into the three questions of quantity of ore, value of the finished product, and cost of production. The first of these will be determined by the operations carried out locally; for the latter two, the reports of the experts will give the answers. In this manner a result will be attained both more satisfactory in itself and more economically than by the employment, on purely exact executive work of a nature that does not require any very high standard of attainments, of a highly paid specialist, who would not have been able to answer the questions which must be submitted to European or American experts.

Operations are now in active progress, and the results of the first weighings give 150 lbs. of clean corundum from 1 ton of rock.

It will be seen that, according to Professor Judd, the corundum and its matrix are both products of alteration of a pre-existing rock, while Mr. Holland, from his studies of the corundum-bearing rocks of Madras, regards the corundum as an original, and in fact the first formed constituent of the rock in which it occurs: Such discrepancies must be expected while our knowledge of the chemical reactions, which go on in the interior of the earth, remains as imperfect as it is at present, and there are sufficient differences in the modes of occurrence of the corundum of the Ruby Mines and of Southern India to render it possible, and even probable, that its mode of origin was not the same in both cases.

141. ***OUTTURN.***—The mines in Salem and South Canara are not worked, though they may be said to have great possibilities. Three tons are reported to have been quarried during 1894, 13 tons in 1895, and 20 tons in 1896 in the Madras Presidency. In Anantapur the industry is reported to be active during the rainy season, especially in one taluq. The mineral is of a sea-green colour. Local price R5 to R7 per 100 seers by measure. (Prov. Index Madras, p. 11.) In Coimbatore and North Arcot, the right of collecting has been leased out for R1,625 per annum and for R2-4 per Indian maund, respectively, from the year 1893. An immense deposit exists near Pipra and Kodopani in South Rewah. During 1896, 2,249 cwt., valued at R3,139, is reported to have been obtained from two mines in *pargana* Bardi. There is a mine at Mouza, which is said to have realized R547 in 1894. In the Nizam's Dominions corundum is found in the Khamameh and Nagar Kurnool districts, and some fine specimens have been found near the Kazipet Station of the Nizam's Guaranteed State Railway. At Yelgandal it is stated corundum was worked during 1895, the produce being valued at R21-4. In the Mysore State leases are sold by public auction.

CORUNDUM. The estimates of Mysore production during the years 1894, 1895, and 1896 were:—

	1894.		1895.		1896.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	℟	Cwt.	℟	Cwt.	℟
Bangalore	Not ascertained.	402	Not ascertained.	321	Not ascertained.	400
Kolar	42	15	...	...	...	...
Tumkur	713	2,708	560	2,133	179	722
Hassan	111	318	210	630	180	540
Chitaldrug . .	2	10	2	8	2	8
TOTAL .	868*	3,453	772*	3,092	361*	1,670

* The total involves an error (relative to value) through the yield of Bangalore not having been returned.

142. ***USES.***—"The uses to which corundum is put, when powdered, are well known. The consumption in India must be considerable, though possibly it was larger formerly than it is at present, as the trade of the native armourer is perhaps not so active as it used to be. A large quantity is employed by the cutters and polishers of stones, both precious and ornamental, who are to be found scattered throughout India. To what extent Indian corundum is used in European countries is not very well known, but it could doubtless be applied to many of the purposes for which the emery of the Greek islands is now used, and which, owing to a monopoly at one time, reached the high price of ₹30 a ton in London." (Mr. Mallett in *Manual of Geology of India, Part III, page* 422, IV.) It is possible also to manufacture aluminium from corundum, and in that direction a great future may be in store for the Indian fields.

The manufacture of a hard substance named "carborundum" has recently been instituted in America, and it is claimed for the mineral that it may supersede emery. It is made by heating together carbon in the form of coke and good glass sand, the heat employed being that of the electric furnace. The works which are situated in Niagara are said to have turned out last year 1,200,000 lbs. or 535 tons of crystallised carborundum.

Enquiry has been made through the Imperial Institute by an English Firm for samples of corundum and garnet sand suitable as an abrading agent. Specimens have been forwarded by the office of the Reporter on Economic Products. Some of these were found to be more or less suitable for the purpose required.

GYPSUM.
[Correspondence File No, 197.]

XIX.—GYPSUM (*Kulnar; Khaṛiyā mittī, Gach, Hind.*).

143. ***OCCURRENCE.***—Gypsum occurs in the following localities;—(1) Trichinopoly, Nellore and Chingleput, Madras; (2) Cutch and the Kirtha range of Sind, Bombay Presidency; (3) near Nagore in the Jodhpur State, Rajputana; (4) Central India (Bijawar and Baraundha); (5) Bannu, Kohat, and the Salt Range, Panjab; (6) Kumaon and Garhwal, North-West Provinces; and (7) in the Pagan sub-division of Myingyan; it is not worked in Burma, as it is of little or no value.

The mines in the Trichinopoly district are not worked, and the quality of the gypsum found in the neighbourhood of Nagore is not as a general rule good, but in the excavation of a well in the Falod *pargana* some of the finest specimens were found. They were, however, at too great a depth to be workable. The mines in the neighbourhood of Nagore are worked in the following manner:—Depressions where the gypsum is found are cleared of the surface sand and earth, and trenches are dug, from which the mineral is removed in the form of clods. The trenches being left untouched for two or three years and exposed to rain, fill up with gypsum, which is again removed. It is used generally as a cement where it is not much exposed to atmospheric changes. The cement is prepared by burning. At present little gypsum is extracted but better results are now hoped for since the opening of the railway to Nagore, which will cheapen the carriage. In Nellore and Chingleput gypsum is met with, as crystals of selenite. The Nellore crystals are stated to be of finer quality and better colour than those of Madras. *Prov. Index (Madras), p. 13.*

The salt in the Salt Range, Panjab, is overlaid by a deposit of gypsum some 15 or 20 feet thick—enough to supply the whole world.

144. ***OUTTURN.***—The production in the Rajputana States during 1894 was estimated at 3,169 tons, valued at ₹2,034, for 1895 at 6,609 tons, valued at ₹3,478, and in 1896 at 7,428 tons, valued at ₹3,904-4-0. In Bundelkhand the production in 1894 came to 118 tons, but in 1895 the production for the whole of Central India was given as 99 tons, valued at ₹402. An outturn of 45 tons, value ₹162, is reported for 1896 from Bijawar, Bundelkhand. During 1896, 12 tons is stated to have been produced in the Madras Presidency, the value of which is not mentioned.

Gypsum is not much utilised in India, though in many of the above-mentioned localities it may be had of good quality. In Bombay it sells at about ₹2 per hundredweight. It is a valuable manure, especially for leguminous crops, in the ash of which it is an important constituent.

XX.—LEAD ORES (*Sisa, Hind.*).

LEAD.

[Correspondence File No. 176.]

145. ***OCCURRENCE.—Madras.***—Extensive old workings occur at Guzalpali in the Kurnool district of Madras, but the mines are not worked at present. The Jungamanipenta lead mines in the Cuddapah district were worked after the Mogul invasion of South India. Kistna, Bellary, and Salem are recorded to have lead mines, now long deserted. In the Bombay Presidency lead ores are found in the Panch Mahal and Narakot (Rewakantha) near the iron ores. In Salem a large quartz lode occurs 3 miles east of Morupur Railway Station; this proved on being deeply prospected in 1882 to contain nests of galena. *Prov. Index (Madras), p 14.*

Bengal.—In Bengal deposits of galena are met with in the Bhagulpur district, and have been more or less worked at various times. Others are found at Dhadka in Manbhum; in the Monghyr district lead ore is met with in the stream beds of the Kharakpur hills near Gungta in the estate of the Maharajah of Darbhanga. This ore resembles *kankar* (*see page 61*) in appearance, the outer surface being carbonated, and it evidently has its origin from a bed or vein of sulphide, which has not, however, been searched for and located. Some years ago a European entered into an agreement with the proprietor of the Lachmipur estates in the Banka sub-division of the Bhagalpur district, Bengal, and commenced mining operations, but very soon discontinued his explorations.

Central Provinces.—In the Central Provinces lead ores have been found in the Sambalpur and Raipur districts.

Panjab.—Lead mines and works were started many years ago near Subathu in the Simla district, and mines have for long been worked by Natives in Sirmur.

Central India.—There are said to be two lead mines, one in Urgarh and the other in Kursa (Rewah State).

Rajputana.—Galena has been extracted in Ajmere, Alwar, Jhabua, and Udaipur, etc.

Burma.—There are old lead mines in the Mandalay and Katha districts of Upper Burma, but they are not now worked. A mine in Bawzaing, Southern Shan States, is, however, worked by a Chinaman to whom a five years' lease of 4½ square miles was granted in 1892.

Lead mining in India may, therefore, be said to be at present practically in a dormant condition.

146. ***TRADE.***—The foreign imports are fairly extensive; last year they were 121,686 cwt., valued at R17,41,162. Of that amount the major portion is returned under "Sheets for tea chests," *viz.*, 80,400 cwt., valued at R12,26,465, the bulk of which naturally was received by Calcutta.

XXI.—MAGNESIA MINERALS (*Zahr mohra; fulsát, Hind.*).

MAGNESIA.

[Correspondence File No. 186.]

147. The very extensive occurrence of magnesite in the chalk hills close to Salem, in the Madras Presidency, is noteworthy, but this valuable supply is not at present utilized. Dr. Heyne was the first to discover these formations early in this century, and Dr. Macleod was the first to bring to notice the useful properties of the mineral in the composition of hydraulic cements, for which he was awarded the sum of R3,000 by the East India Company. Magnesia was subsequently found in large quantities near Trichinopoly on the banks of the Cauvery. The reader should consult the recent Report by Mr. C. S. Middlemiss of the Geological Survey with regard to the present position of magnesite in the Salem district and published in the Agricultural Ledger No. 15 of 1896.

Veins of this mineral are also met with in Arakan and in Manipur, as also traces near Mussoorie. Near the Happy Vallay in the latter district, three outcrops, four feet thick,—a mixture of fine white powder and of coarser rock—have been discovered. Twenty per cent. of the coarse rock obtained contained nearly equal quantities of magnesium carbonate and calcium carbonate. The white powder amounted to 80 per cent., and by analysis was found to be composed as follows:—Silica, etc., 6; Alumina, ferric oxide, etc., 3; Calcium carbonate, 7; Magnesium carbonate, 84; Total 100.

XXII.—MANGANESE ORES (*Kolsa-ka-pathar, Hind.*).

MANGANESE.

[Correspondence File No. 185.]

148. ***OCCURRENCE.***—The following extracts from a paper on "Indian Manganese Ores" recently read before the Iron and Steel Institute by Mr. H. G. Turner will best give the position of the industry in this mineral:—

Mr. Turner pointed out that India was one of the sources of supply of manganese ore. It was, however, only recently that manganese ore had been sent to Europe and also to the United States. About five years ago attention was directed to a small deposit of this ore in the Vizagapatam District of the Madras Presidency, and further exploration brought to light the occurrence of the mineral in large quantities throughout a considerable extent of country. The ore outcropped in various places over, so far as was known, an area of 100 square miles, situated within the extensive territories of His Highness the Maharaja of Vizianagram, a well-known and distinguished Hindoo nobleman. Topographically, the manganiferous area was part of the littoral tract of country which stretched between the range of mountains known as the Eastern Ghâts and the Bay of Bengal. It was somewhere about 500 miles north of the city of Madras, and about the same distance south of Calcutta. The East Coast railway passed over the area, and two good roadsteads were within 40 and 60 miles respectively. Vizagapatam, the latter port, was touched by the railway, and all the ore exported was sent by rail to, and shipped from, that port. Unlike many manganese deposits in other parts of the world, these Indian deposits of ore occurred not in a mountainous tract, but in a plain country, through which the railway passed on a gradient which rose but little above sea-level.

MANGANESE.
[Correspondence File No. 185].

Being densely populated, every cultivable acre thereof was under the plough. Agriculture was the only local industry, and there was a large surplus population from which abundance of labour was procurable in all months of the year. Even during tilling time (in June and July) and in harvest time (December and part of January), when the supply of coolies diminished, there were always sufficient hands to keep the mines going. The climate was perfectly healthy throughout the year, and suitable for Europeans.

The outcrops of manganese ore occurred either in the form of mounds, of low hills, or as isolated blocks, while in some places the soil, impregnated with black oxide of manganese, gave indications of ore beneath the surface. The first mound discovered was within a few hundred yards of the railway. Unaware of its nature and value, the railway contractors were breaking up the boulders of manganese rock for ballast. This mound consisted of about 60 acres of black manganese rock and boulders intermixed with an alluvium of decomposed gneiss. Further investigation showed it to be the butt-end of a deposit of vein-like masses of ore and detached boulders imbedded in detritus of country rock. This deposit being about 2½ miles in length, comprises an area of 660 acres. There was probably a spine, or the remains of a spine, of hard ore all along this length. The detached blocks of ore exhibited marks of being water-worn, and these occurred in all sizes, from a pebble up to great boulders of several hundredweight. These broken fragments were disseminated throughout the soil—sometimes so sparsely as to make quarrying unprofitable, at other places in drifts and beds several feet thick.

During the current year some 30,000 tons of ore had been sold, and were being shipped from this mine, by the owners, the Vizianagram Mining Company. The high-class ore went to the ferro-manganese makers, and the lower class to the basic furnaces, while the pyrolusite was taken by chemical works.

Recently other deposits had been discovered, notably one at a village called Garbham, some ten miles from the Kodur mine. An experienced engineer from a well-known London firm had visited this deposit, and reported that it probably contained 1,500,000 tons of ore down to water-level, *i.e.*, above the water level of the country. This deposit consisted of a mass of ore some 80 feet high, half-a-mile long, and 100 yards wide, with two small outliers. Works were being started in this remarkable hill. The whole mass appeared to consist of great slabs of manganese ore of various quality. Shipments thereof were being made based on samples which had been approved by brokers and consumers. It was proposed to lay down a tramway line to facilitate the transport of the ore to the railway. The Vizianagram Mining Company were in treaty for the purchase of the property.

The general character of the ore was hard, compact, and well suited for use in the blast furnace. The mechanical condition of the rich ore, coupled with its very low content of silica, admitted of its being mixed to advantage with the lower phosphatic ores from Brazil and Chili. Thus, the blending of the Indian phosphatic ores, free from silica, with the ore supplied from other sources, enabled the furnace-masters to effect an economy in the cost of the burthen varying from 5 to 10 per cent. An additional economy arose from the fact that the Indian mineral carried sufficient iron for the manufacture of ordinary qualities of ferro-manganese, and contained more phosphorus than the Brazil and Chili ores; its behaviour in the furnace left nothing to be desired. It was comparatively free from silica (averaging about 3 per cent.); it existed in enormous quantities, and was cheap to work, to rail, and to ship. Considerable progress was noticeable in the demand for the ore, and there was every probability of a large and valuable trade being established within a short period of time.

Mr. Turner gave the following typical analyses of ore sold to various consumers in England, on the Continent, and in America :—

	I.	II.	III.	IV.	V.
Moisture	1·10	1·30	1·65	1·80	1·48
Manganese	48·65	46·13	50·35	45·08	47·09
Iron	7·10	10·35	6·38	13·23	10·80
Phosphorus	0·12	0·21	0·24	0·27	0·26
Silica	2·23	3·20	3·21	4·60	2·45

Note.—I., Kodur ore; II., Kodur ore; III., Garbham ore; IV., Garbham ore., V., Garbham ore cargo test.

This ore is reported to occur also in Bellary, Kurnool and Nilgiri districts and the Pudukkotai State of the Madras Presidency.

Manganese ores are found also in the trap rocks of Belgaum, Dharwar, and Ratnagiri districts in the Bombay Presidency. Jhabua in Central India is also said to possess valuable supplies of this mineral which are not as yet employed industrially. But the most famous, and in some respects perhaps the most hopeful locality for future development is Gosalpur in the Jabalpur district of the Central Provinces. It has been reported that a lease has been granted of these mines to a European firm, but in the returns of 1895 no mention is made of any progress. The Review for 1895 stated that the ore was extracted by labourers who wash it in the Hiran stream before exportation.

An extensive bed of ore—thought to be of several square miles in extent—has been reported to exist in Lower Burma. It unites three localities: the bank of the Thugoo stream, the bank of the Thirabuen and the Great Tenasserim river. The ores are stated to consist of black and grey oxides and wad.

MANGANESE.

149. ***OUTTURN.***—During the year 1895 the Madras Presidency is said to have produced 15,816 tons, and during 1896, 56,869 tons, but the published exports from Madras for 1895-96 came to 22,758 tons as will be seen from the following statement:—

Exports of Manganese Ore from British India by Sea to other Countries during the past four years:

From		COUNTRIES TO WHICH EXPORTED.							
		UNITED KINGDOM.		FRANCE.		UNITED STATES.		TOTAL.	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		Cwt.	₹	Cwt.	₹	Cwt.	₹	Cwt.	₹
Madras	1892-93	20,000	8,000	...	...	...	...	20,000	8,000
	1893-94	33,000	13,200	...	...	...	...	33,000	13,200
	1894-95	122,320	48,928	6,000	2,400	...	...	128,320	51,328
	1895-96	387,160	1,54,864	...	...	68,000	27,200	455,160	1,82,064

So far as is known no other province than Madras exports this mineral. The trade, as already remarked, is a new one and one that will be seen to have made remarkable progress during the past four years.

XXIII.—MICA (*Abrak, Hind.*).

MICA.

150. ***OCCURRENCE.—Bengal.***—Commercially Mica is sometimes spoken of in India as Talc, though mica and talc are different minerals. The former is elastic and cleavable into sheets, the latter flexible and seldom in sheets or scales (*Conf. with Soapstone, p. 51*). Mica lands belong either to the Forest Department or to the Zemindars, for which leases are taken out by the miners. They are leased out at a fixed royalty of ₹50 an acre. The miner has to ascertain for himself, by excavation, the kind of stone that lies underground. Mica lies within huge blocks of stones which have to be blasted before the mineral is reached. A cheap gunpowder manufactured locally is used for this purpose. After the upper layers of the blocks, which are usually cracked, have been removed, the lower layers of good quality are prepared for export. The largest size, *viz.*, 25 inches long and 5 inches wide is known as No. 1. Mica is cut into sizes by skilled men with an instrument called *hasya*. Unstained good ruby-coloured mica realises as much as ₹800 per maund. There are 222 mines now in existence in Bengal covering 141 acres. The main region of mica production is in the Hazaribagh district of Bengal where the mines in the Koderma Government estates and in the Gadis-Gawan are being utilised. It is also found in the Gaya, Monghyr, and Bhagalpur districts of the same province, but only two mines, *viz.*, one at Sapahi and one at Singar in the Gaya district are now worked. The Singar mine produces white mica and has been worked for 30 years. The ruby coloured mica of Bengal is held in great estimation. The Conservator of Forests, Bengal, in his Progress Report for 1895-96, Appendix B, offers some useful information on the subject of the mica mines that fall under his control. It would seem that last year there were 44 new mines opened out. The revenue derived by the Forest Department was last year ₹12,343 from mica mines. [Correspondence File No. 184.]

Madras.—"Mining for this mineral may be said to have commenced in the Nellore district in 1887; the work was carried on in a desultory way until 1890. That year, owing to the suc cessful results obtained from one mine which had been worked since 1888, numerous plots were purchased for mining at fancy prices; many of these were abandoned as unprofitable. In 1890, as the result of inspection of the mica mines by Dr. Warth, a suggestion was made to impose a royalty upon mica exported from Madras. It was, however, resolved to await further development of the industry. The work languished until 1895. In the year under report the applications for mining leases rose to 270, and operations, which hitherto had been confined to the Rapur taluq, extended generally to other taluqs. The levy of a royalty upon the out-turn is again under consideration."—(*Annual Report, Madras Forest Department, 1895-96*, page 46, para. 75.) "The Madras Index of Local Minerals," written by Dr. King and Mr. Middlemiss, gives useful particulars regarding the mica found in South India. Though the mineral seldom occurs in large enough plates to be of commercial value for minute work and spangles, good enough material can be obtained in most districts as in Bellary, Coimbatore, Salem, Trichinopoly, etc.

Sind and Rajputana.—Mica is found in the Shabhabunda taluq of the Karachi district of Sind; in the Kishengarh State of Rajputana; and near Jambagaun, 20 miles west of Chota Udaipur in Rewakantha. The Kishengarh mica is said to be not very pure, and to occur in pieces not large enough for trade; it has been officially announced that during 1896 the mines were closed.

Nizam's Dominions.—The Hyderabad mines have been considerably worked by the Hyderabad (Deccan) Company, but the variety of mica chiefly met with is biotite, and is generally so largely impregnated with iron as to be of inferior commercial value.

Mysore.—Mica occurs also in the Mysore State and in Burma. In the latter province the mineral is found in the Ruby Mines district, near Chaukkyi in the Twinngé township, and in various parts of Mogôk township. It is reported that no persons are at work at present.

151. ***OUTTURN.***—The estimated production during 1894 was 180 tons, valued at ₹1,45,388, but in 1895 the output came to 375·9 tons, valued at ₹3,16,614, and in 1896 to 309·2 tons, valued at ₹3,42,470.

MICA.

These figures thus show a slight falling off as compared with the last year's production of 11·34 per cent., but they also show a small increase in value compared with 1895 of 8·16 per cent. In the review for 1894 it was pointed out that the declared production for some years past had rarely been more than one-half the quantities shown to be exported. The figures of production in 1895 were considerably in excess of the demands of the foreign trade and would thus appear to be very possibly correct. This year the production fell considerably short of the amount shown as exported so that the surplus stock of last year may have been drawn upon. The total number of persons employed on the Hazaribagh mica mines (or rather quarries) has been returned at 3,656 permanently, 1,766 temporarily. Mr. James Grundy (*Report of the Inspection of Mines in India, 1895*) enumerates these mines. He shows 208 in the Hazaribagh district of Chutia Nagpur Bengal. The largest owners of these would appear to be Messrs. F. F. Christein & Co. of Tisri *viâ* Bhurai, with 110 mines; Mr. W. R. Macdonald of Koderma with 28 mines; Babu Raj Krishna Sahana of Koderma with 31 mines; Mr. W. D. Clyburn of Koderma with 13 mines; Mr. C. A. Dickson of Koderma with 9 mines; Babu Nund Lal of Domechanch with 3 mines; Tikait Thakur Narang Singh of Ghorunji with 8 mines; and several other smaller owners with each one or two mines. In the Monghyr district of Bengal Mr. Grundy shows 4 mines, of which the following may be mentioned :—The New Indian Mica Company; Messrs. F. F. Christein & Co.; and Mr. C. W. F. Buckland and E. M. Floyd. In the Gaya district Mr. Grundy mentions two mica mines, *viz.*, the Sapahi mine owned by Babu Dirgopal Lal and the Singar mine leased by Messrs. Christein & Co.

Of the Nellore district, Madras, Mr. Grundy refers to 4 mica mines, 3 of which are owned by Messrs. Kudah Budusha Company, Madras, and the fourth by Mr. K. Munisami Iyer of Madras. Returns from Madras Presidency show outturn in 1896 of 22 tons, the value of which is not stated.

152. ***PROSPECTS.***—The method of working is not the same in all the mica-producing districts. For instance, in Gaya the quarries are worked by manual labour and blasting. In Monghyr they are formed by means of iron crowbars and the rocks are sometimes blasted by dynamite, and the strata of mica thus removed. Where the surface gives indications of mica, pits are frequently sunk. In Hazaribagh, the mines are worked in the Native fashion by means of pits, and no European machinery or contrivances are resorted to. The industry cannot be said to be in a very flourishing condition in the Nellore district of the Madras Presidency. Indeed, most of the workings have proved unsuccessful, and many persons who have obtained leases to work the mineral have had them cancelled.

153. ***TRADE.***—The demands for Indian mica continue to increase as the uses of the mineral are extended for electrical purposes, for gas furnaces, for cooking stoves, lamps, and the like.

The following statement may be given of the foreign traffic in mica :—

Exports of Mica from India and the Countries to which exported.

Provinces from which exported.	1890-91.		1891-92.		1892-93.		1893-94.		1894-95.		1895-96.	
	Cwt.	₹	Cwt.	₹	Cwt.	₹	Cwt.	₹	Cwt.	₹	Cwt.	₹
Bengal	6,351	9,12,450	2,298	4,28,393	3,310	4,33,772	4,843	7,65,879	5,126	6,04,719	8,835	9,95,102
Bombay	33	575	27	314	18	511	5	120	10	879	77	2,829
Burma	...	...	...	...	1	65	6	700	6	712	1	220
TOTAL	6,384	9,13,025	2,325	4,28,707	3,329	4,34,348	4,854	7,66,699	5,142	6,06,310	8,913	9,98,151

Countries to which exported.	1890-91.		1891-92.		1892-93.		1893-94.		1894-95.		1895-96.	
	Cwt.	₹	Cwt.	₹	Cwt.	₹	Cwt.	₹	Cwt.	₹	Cwt.	₹
United Kingdom	3,248	4,48,864	819	1,18,932	1,388	2,40,952	2,598	5,28,514	3,039	2,78,135	3,466	4,56,942
France	8	785	10	1,340	...	...	26	8,150	20	5,050	3	1,000
Germany	170	34,363	73	17,425	5	764	169	33,518	92	28,038	285	21,794
Egypt	...	...	12	120	...	...	...	...	...	...	...	...
Mauritius	...	...	...	...	...	...	...	...	...	...	...	...
Austria	...	...	...	...	100	236	...	...	4	1,747	2	802
United States	2,947	4,28,878	1,401	2,90,806	1,834	1,92,380	2,061	1,96,517	1,937	2,91,940	5,076	5,11,088
Arabia	...	...	10	84	...	...	...	...	...	...	...	...
Straits Settlements	11	135	...	...	...	...	...	...	24	228	4	80
Natal	...	...	...	...	2	16	...	...	...	...	...	...
Other countries	...	...	...	...	...	...	...	...	26	1,172	77	6,445
TOTAL	6,384	9,13,025	2,325	4,28,707	3,329	4,34,348	4,854	7,66,699	5,142	6,06,310	8,913	9,98,151

MICA.

154. The following passages are taken from the provincial reports for 1896 by way of amplifying the particulars above.

Bengal.—In the Nawadah sub-division of the Gaya district there were four mines at work, *viz.*, (1) at Singar, (2) at Chatkari, (3) at Sapahi, and (4) at Belam. The estimated production is 36·7 tons valued at ₹26,110. The estimated production in Monghyr is 14·5 tons, valued at about ₹5,700. The estimated production in Hazaribagh is 258 tons, valued at ₹3,10,523. A sum of ₹8,249 was credited to the Forest Department on account of mica mines during last year as against ₹7,697 in 1894-95.

Burma.—*Ruby Mines.*—About seven or eight men were engaged in extracting mica during 1895. About 32½ cwt. of marketable quality, valued at ₹80, was obtained. The return for last year is blank.

Madras.—Of very inferior quality available in considerable quantities at Kodur and between it and Chipurupalle in Vizagapatam, but not of marketable value and not worked.

The mineral is also found in certain places of South-East Wynaad in the Nilgiri district, but is not worked. Production in 1895, 23 tons and in 1896, 22 tons.

Mysore.—Estimated outturn during 1895, 61 cwt., valued at ₹244. The figures furnished for 1896 are 41 cwt., valued at ₹137.

Grants and Licenses since 1889.—Sixty-nine mining and prospecting grants and licenses have been issued, 36 being in 1895, and 34 in 1896. It may, in fact, be said that, comparatively speaking, greater activity has been shown with mica than with any other mineral.

XXIV.—PLUMBAGO (*Sisa, Hind.*).

PLUMBAGO.
[Correspondence File No. 197.]

155. ***OCCURRENCE.***—The localities where Plumbago (Graphite) has, perhaps, been found most abundantly in India are in the Madras Presidency, especially in Travancore, where the mineral is of better quality than elsewhere, although apparently inferior to that worked in Ceylon. In Travancore the mineral is found in Vallanad in the Neduvengad taluq. It is worked by sinking shafts in the veins and sloping away intermediate blocks of vein, which are subsequently filled up with rubble from the surface. A poor quality of graphite occurs in the Vizagapatam district. Dr. W. King (*Provisional Index of Distribution of Important Minerals*) says of this locality that the mineral is "the best form of graphite known in the Madras Presidency. It exists in fairly large quantity." An announcement commented on in the Review for 1895 of recent discoveries of plumbago in the Godavari district excited some interest. It may, therefore, be useful to quote in this place the official information to hand on that discovery. "Adverting to Board's memorandum No. 1759 Mis., dated 9th April 1896, I have the honour to state that good graphite is obtainable in several parts of the Bhadrachalam taluq and in the Rampa Agency. The partners of Messrs. Binny & Co. of Madras and those of Messrs. Hall, Wilson & Co. of Cocanada have applied to me for licenses to prospect for this mineral in the villages of Peddakonda in the Bhadrachalam taluq and in Yerramattaloo in the Rampa Agency. Licenses to prospect for the mineral in the former village have been issued to them for a period of six months commencing from 13th February 1896. The Special Assistant Agent has recently sent to me a quantity of black earth resembling graphite, procurable from a hill known as Korukonda Hill, in the Rampa Agency. I have sent it to the Chemical Examiner to the Government of Madras for analysis. No reply has yet been received from him."

Plumbago has been found to occur in a considerable bed at a place called Mulkanoor in Hyderabad. In Bengal it is found at Kakwara in South Bhagulpur, and is said to be met with in the Banka sub-division of the same district. The search made at Kakwara to find larger deposits has not been successful.

It may thus be added in conclusion, on the subject of the Indian sources of this mineral, that masses of several pounds' weight, much mixed with earthy matters, have been met with in places wide apart, but no vein or shoot of any extent has as yet been discovered.

156. ***OUTTURN.***—The quantity produced in 1894 at Travancore was 1,597 tons, the value of which is not stated; returns for 1895 and 1896 have not been furnished. Regular mining is carried on, but the industry is depressed through the inferior quality of the mineral, though it is available in abundance.

XXV.—SOAPSTONE (*Abrak, Hind.*) STEATITE or MASSIVE TALC.

SOAPSTONE.
[Correspondence File No 182.]

157. ***OCCURRENCE.***—The common coarse variety of this mineral is known as Potstone.

Madras.—The finer forms of the rock for which there is a demand in England, are not very extensively met with in India; the best occurs near Betumcherla in the Kurnool district of the Madras Presidency. Following that, the soapstones of Anantapur, North Arcot, Bellary, Cuddapah, Salem, Malabar, Nellore, South Kanara districts and Pudukkotai State may be mentioned. There is no established industry in the soapstone of Anantapur and Kurnool, the mineral-bearing localities being, in fact, included in the forest reserves. The stone has been worked for several years, however, under forest permits in Sydapuram village of the Nellore district, where the yield is said to be inexhaustible. The excavation of the stone constitutes the only source of living to a large number of families in the villages where it occurs. Some speculators applied for mining rights under the lease system, but in consideration of the stone affording a living to the villagers the permit system has been kept in force.

In two villages of Cuddapah, quarrying of soapstone is carried on on a somewhat large scale. The stone is found on the sides of hills at a small depth from the surface and is dug out by means of crowbars.

SOAPSTONE. The working season is between January and July, and two to sixteen cart-loads of 33 maunds each are quarried in the course of a month.

This stone is reported to occur in the Warungal and Indore districts of His Highness the Nizam's Dominions. During 1896 the production was valued at ₹73. Quantity cannot be furnished as the working of the mines is given out on contract.

INDIAN USES.—In Salem potstone is excavated and chiselled into culinary utensils of various sizes by professional workers, and these vessels are exported to different districts. There is a regular industry in these commodities. The trade in Bellary stone vessels has not been flourishing as there is not much demand for the articles. The stones from Cuddapah are used for polishing the walls of buildings, and are chiefly sent to Madras, where there is a great demand for this kind of work. Specially prepared pieces are also employed as pencils for writing on slates. An inquiry has lately been made for the supply in England of steatite for making gas burners.

The quantity of soapstone produced during 1891-92 was 321 tons. Separate returns for 1894 were not available, but it is stated that the total production of the Presidency including the Native States was in 1895, 103 tons. The yield during 1896 has been returned at 212 tons, the value of which is not stated.

Bombay.—The stone in Malabar is said to be very gritty. It is found in the Dharwar, Belgaum, Kolhapur, Ratnagiri, and Kanara districts of the Bombay Presidency.

Bengal and North-West Provinces.—In Bengal soapstone is met with in the Manbhum district. It is also found in the Jhansi district of the North-West Provinces, at the Hamirpur and the Lalitpur sub-divisions. The total production in 1894 was estimated at 92 tons, in 1895 at 59 tons, and in 1896 at 45 tons. The stone is obtained from open working and is made into cups, images, and the like. The industry, however, is of very trifling character.

Central Provinces; Rajputana and Central India.—The marble rocks in the Jabalpur district and Kanheri in the Bhandara district of the Central Provinces give capital stone. In fact, the next best localities are in the Jaipur State of Rajputana. The mineral also occurs in the Bundelkhand States of the Central India Agency as, for example, at Orchha and Bijawar. The revenue from the stone in the former was last year ₹1,975, and in the latter the production was 75 tons, valued at ₹675.

Mysore.—The returns furnished by this State show a production in 1896 of 565 tons, valued at ₹1,554.

Burma.—There are mines of soapstone in the Prome, Pakôkku, Katha, Bhamo, Kyaukpyu, and Minbu districts of Burma. On the hills round Prome it lies about a foot and a half below the surface. The Minbu quarries and those in Kyaukpyu district, where four out of the twenty-six mines are being worked, are all in a group on the borders of Arakan and Upper Burma. The steatite occurs in veins of 6 inches to a foot thick. In the Bhamo district soapstone is met with to the north and north-east of the Jade and Amber mines, and in another distant locality far up the Irrawaddy. Several of the Minbu quarries are annually leased to Burmans, the leases being disposed of by auction. In some cases, besides a lump sum down, a royalty on the outturn varying from 10 to 20 per cent. is reserved to Government.

158. ***OUTTURN.***—The Burmese (Minbu) production in 1894 was said to have been 16 tons, valued at ₹12,500. In 1895 it was 19 tons, valued at ₹3,750. No explanation was offered as to the reason of the difference in the valuation as compared with the returns of 1894. In 1896 the yield is reported at 12 tons, value ₹6,000. The decrease in the outturn is attributed to the inability of the lessees to work continuously on account of the malarious state of the country. The increase in value is probably due to greater demand. During 1894 the outturn in Hyderabad was put at ₹117 worth, in 1895 at ₹114, and in 1896 at ₹73. Particulars as to quantity are not available, since the sums mentioned were the license fees for permission to work the mines. The soapstone produced in the Mysore State in 1894 was estimated at 597 tons, value ₹2,252, in 1895 at 215 tons., valued at ₹950, and last year at 565 tons, value ₹1,554. The production in the Madras Presidency in 1894 was put at 58 tons, in 1895 at 103 tons, and in 1896 at 212 tons. The value of the outturn in Bundelkhand, Central India, for 1894 was estimated at ₹2,025. The value of the production in 1896 is stated at ₹2,650. Figures showing total quantities produced are not given. The total number of persons employed at Steatite mines (permanently and temporarily) has been returned at 200.

159. ***USES.***—The modern European demand for steatite to be used in the manufacture of gas burners and other purposes is considerable. But for burners steatite that can stand a high temperature is essential and it must be fine in texture and free from grit. In testing for quality the mineral should be broken across the grain to see that it is not flaky or scaly. From recent reports on this subject it seems likely that the future may see a greatly extended foreign demand in competition with the steatite obtained from Germany.

XXVI.—TIN ORES (*Rang, Kallai, Hind.*).

TIN ORES.

[Correspondence File No. 177.]

160. ***OCCURRENCE.***—These are only known as yet to occur in any very promising quantity in Maliwun sub-division of the Mergui district of Lower Burma, where the mines are in a portion of the great stanniferous belt that stretches along the granite backbone of the Malay peninsula with scarcely an interruption. In Mergui they extend continuously in fact from the Siamese frontier along the whole seaboard to at least the latitude of Tavoy, beyond which the great gigantic axials disappear below the greater overlying deposits of more recent stratified rocks that sweep southward. The interior is but little known, and it seems that the heaviest out-crops of the granite, with which the tin is associated, are the more plentiful towards the coast.

Judging, however, from the fact that heavy tin is worked on a commercial scale at Thibawleik in the Tenasserim valley, and that tin is found in the Siamese States of Bantaphan, of Chomphom, and Faungswan, along the Gulf of Siam, it is hoped that the main watershed may be found to throw off spurs of stanniferous granite at least as valuable as the out-crops in the secondary axials along the coast. In the Maliwun sub-division there are four main centres at which tin is worked, though these form practically the four earliest points of attack along a more or less continuous stanniferous belt, running for 200 miles north and south, with a mean width of perhaps 30 miles.

The main points give their names to the four principal fields :—

(1) Maliwun.
(2) Karathuni, Banhuni.
(3) Bokpyin.
(4) Migyaungchaung, Yayugon.

In these and all other fields the tin occurs in more or less imperfect fissure lodes, frequently shattered and distorted by more recent movements, which (as at Maliwun and Renaung) are not unseldom accompanied by silicious hot springs, probably rising on the lines of *fault* through which the tin has penetrated. Occasionally also they permeate the metamorphic rock through which the granite has been upheaved.

The lodes except Khowmaung near Maliwun, where a few Chinese have been for some time picking at the out-crop with crowbars, are not worked commercially; specimens of heavy tin ores received from Hangpon, Bokpyin, Sadein, and Thibawleik prove these lodes to be widely distributed. The alluvial tin has been derived from these lodes by the gradual denudation of the hills containing them, and is now deposited in the form of a more or less coarse sand mingling with the gravels and other alluvial deposits in the river valleys and gentle slopes at the foot of the granitic hills.

In this operations are carried on by a simple process of alluvial working, ranging from the rude methods of the " Tampan " (= hill, a Chinese word) worker, who contents himself with " fossicking " in the narrow hill valleys, to the larger open mines on the plains, where immense gravel pits are opened, and the " Karang " (or pay dirt) is raised from depths of sometimes as much as 30 feet. This *karang* contains the tin oxide which is separated from it by working. The ore is then smelted with charcoal in a small open blast furnace of the pattern known as the *pon kah* furnace.

161. ***OUTTURN.***—The total output in 1894 was 98 tons, valued at ₹1,08,700, of which 81¼ tons were exported, valued at ₹89,650. The balance, 16¾ tons, were kept for export in 1895, the market having fallen towards the end of the year. The *Financial and Commercial Statistics of British India for 1894* show the production having been only 22½ tons, valued at ₹25,582. The returns furnished to this office by the Burma Government as the Mergui production of 1895, come to 438 cwt., valued at ₹23,464. There would thus appear to be some mistake, and it is perhaps safer for the present to disregard these quotations of production. The outturn during 1896 is reported to have been 1,628 cwt., valued at ₹81,443.

The industry, which has been for many years in a depressed condition, was in 1894-95 thought to be reviving. The returns for 1895-96 were not, however, very encouraging. It is difficult to say how many persons are actually employed in this industry, since the bulk of the extra hands in the rains are as much fishermen or agriculturists, as miners. The figures published for 1893-94 show 407 persons permanently employed and 205 temporarily. In 1895 they were 83 and 97, respectively. A great stimulus was thought to have been given to the tin industry by the grant of a lease to Captain Menzell of Singapore. The lease was granted in 1892 and conveyed to the Captain exclusive rights for five years of mining for tin in the Maliwun township, except in areas occupied by Native miners. On the expiry of that period, a lease for 21 years was granted to Captain Menzell on the condition that he had worked his five years' concession in a satisfactory manner. Captain Menzell began operations by importing a number of Chinese miners from the Straits Settlements, and he is said to have been hopeful to increase the number of his miners and develop the concession rapidly. Returns for 1896 state that the lease has since been transferred to the Jelebu Mining Company.

162. ***TRADE.***—The trade in tin consists for the most part of imports from foreign countries. During the past five years these have averaged 44,218 cwt., valued at ₹30,76,094. The imports in 1893-94, 1894-95 and of 1895-96 and the countries from which these supplies were drawn are shown by the following table :—

Imports of Tin, 1893-94 and 1894-95 and 1895-96.

Countries whence imported.	1893-94.		1894-95.		1895-96.		Share taken by each Province.	1893-94.		1894-95.		1895-96.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Province.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	₹	Cwt.	₹	Cwt.	₹		Cwt.	₹	Cwt.	₹	Cwt.	₹
United Kingdom .	1,572	1,13,889	2,947	89,459	832	55,243	Bengal . .	25,386	18,20,208	27,724	18,06,505	27,335	18,53,924
Ceylon . . .	83	4,414	20	1,474	...	24	Bombay . .	14,931	10,74,410	14,455	97,89,932	15,573	9,57,825
China—Hongkong.	37	2,834	8	630	18	1,499	Sind . .	1	100	...	...	17	358
Straits Settlements.	44,208	31,54,004	45,444	31,14,782	49,431	32,32,500	Madras .	4,663	3,14,242	5,206	3,56,602	6,643	4,31,692
Other Countries .	6	576	6	658	48	4,839	Burma .	925	66,757	1,040	46,964	761	50,306
TOTAL .	45,906	32,75,717	48,425	32,07,003	50,329	32,94,105	TOTAL .	45,906	32,75,717	48,425	32,07,003	50,329	32,94,105

TIN ORES. The exports of tin were last year 105 cwt. of ore to the Straits Settlements from Burma and 155 cwt. block tin also from Burma to the Straits with 1 cwt. from Sind.

XXVII.—SALTPETRE or NITRE (*Shorá, Hind.*).

SALTPETRE.

[Correspondence File No. 197.]

163. ***OCCURRENCE.***—The Saltpetre of Indian commerce is derived mainly from Behar (chiefly Tirhut, Saran, and Champaran), and to a very much less extent from North-West Provinces (Cawnpur, Ghazipur, Allahabad, and Benares), with a small amount from the Kashmir (outturn in 1896, 19 cwt., value ₹143), Panjab, Central India (production in 1896 at Bhind and Jwargarh reported to have been 14 tons, value ₹1,336), Bombay, Madras (Coimbatore, Kistna, Madura, Nellore, Salem, South Canara, Trichinopoly, etc.), and from Burma.

Under the name of *Shorá*, it occurs as a natural efflorescence on the surface of the ground. It is in that condition mixed with several other salts, chiefly the chlorides of potassium and sodium, nitrate of lime and sulphate of soda. The last-mentioned salt is, as a rule, the most abundant. But the saltpetre lies as it were in patches, some parts of the efflorescence being more productive than others, according as carbonate of lime and sand predominate. [For some particulars of the common salt prepared at saltpetre refineries see pages 8 and 10.]

164. ***REFINING.***—The *Loneahs* (or rather *Nuniahs*) or Native manufacturers of saltpetre commence operations in November by scraping off the surface soil from waste ground, mud, buildings, etc. This is then purified by solution and filtration, the principle involved in the purification being the varying rates of solubility of the salts at different temperatures. The next stage is to evaporate the saltpetre liquor to a crystallising state. This is generally accomplished from April to June. For this purpose the liquor is put into earthen pots fixed in two rows over an oblong trench dug in the ground. The interspaces between the pots are filled in with clay and an aperture left at the further end to allow of the escape of smoke, so that the contrivance becomes converted into a crude furnace. The fuel employed is generally the dry fallen leaves of the mango tree. In the North-West Provinces and Oudh the brine, instead of being evaporated and concentrated by artificial heat, is often placed in shallow *chunam* pans and there allowed to evaporate through the heat of the sun. This process is slower but less expensive and the result the same.

After evaporation has been carried to the crystallisation stage, the liquor is removed and the salt allowed to deposit on cooling. Glue is not employed in India to assist in the separation of the extractive matters. The saltpetre manufacture in this way is for the most part a crude article which has again to be refined at the Calcutta refineries. "To make refined saltpetre, crude saltpetre is merely dissolved either in a menstruum of water or saturated brine, and the foreign salts being removed by precipitation in the process of boiling, the saltpetre brine, thus freed from impure or foreign salt, is strained and purified and set to clear, and is cooled until the crystals of pure saltpetre are completely formed. These are collected, washed in water or alum water, drained and dried. They are then fit for the market and are often found to possess a high degree of purity. The foreign substance removed by precipitation is chiefly common salt." The area over which saltpetre is manufactured has been estimated at 232,314 square miles. In 1892-93 there were 543 licensed refineries and 44,925 licensed works for the manufacture of crude saltpetre. In that year the manufacture came to 48,800 tons of crude saltpetre, of which 47,580 tons were purchased by the refineries and purified—yielding rather over 27,580 tons of refined saltpetre (*Systems and Practice of Salt Administration in India*).

The *Financial and Commercial Statistics* for British India, Fourth issue, 1897, show for the year 1895, 315 refineries in Bengal that give employment to a staff of 4,289.* In Madras the corresponding figures would appear to be 1,388 refineries (1,293 of which are in Coimbatore) employing a staff of 367. In the Panjab there is only one refinery (the Saltpetre Factory at Hodal) that gives employment to 200 persons. The Census of 1891 puts the saltpetre workers and sellers for all India at 119,558, of whom 2,631 were recorded as residing in Native States.

165. ***TRADE IN SALTPETRE.***—In last year's Review of Mineral Production a passage was quoted to show that the uses of saltpetre had within recent years been narrowed.* It is believed that the low prices that prevailed during 1895-96 encouraged, however, a revival of the exports, and in consequence the returns of last year stood at 421,769 cwt., valued at Rx. 535,945, or an expansion on the exports of 1894-95 that came to 19·4 per cent. on the quantity and 30·28 per cent. on the value. The highest record took place in 1849-50 when 508,316 cwt. were exported, the lowest in 1893-94 when only 321,933 cwt. were exported. It would appear probable that the year 1896-97 will manifest a continued expansion. The following were the exports during the past 15 years :—

	Cwt.	Rx.		Cwt.	Rx.
1881-82	354,860	359,437	1889-90	422,229	411,276
1882-83	399,565	388,766	1890-91	399,690	380,059
1883-84	491,668	464,410	1891-92	389,185	365,618
1884-85	451,917	425,000	1892-93	443,931	438,940
1885-86	402,174	370,200	1893-94	321,933	338,102
1886-87	397,572	376,091	1894-95	352,985	411,365
1887-88	386,396	364,016	1895-96	421,769	535,945
1888-89	420,503	401,801			

* In the case of 54 refineries at Durbhanga, information under this head was not furnished.

The following tables classify the exports of saltpetre from India during the past five years under the provinces from which exported and the chief countries to which exported :—

Exports of Saltpetre from India and the Countries to which exported.

Provinces from which exported.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Bengal	386,366	438,408	320,438	350,604	418,362
Madras	89	46	6	62	11
Bombay	385	1,194	796	958	1,139
Sind	2,345	4,283	693	1,361	2,257
Burma	...	...	...	...	...
TOTAL	389 185	443,931	321,933	352,985	421,769

Exports of Saltpetre from India and the Countries to which exported.

Countries to which exported.	1890-91.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
United Kingdom	136,904	130,923	153,108	123,332	114,003	117,028
United States	132,304	116,172	142,830	65,340	86,711	126,251
Hongkong	82,350	78,632	83,864	63,115	88,015	116,920
France	5,971	10,185	6,876	8,751	5,723	4,395
Mauritius	24,908	30,552	31,345	33,437	32,358	28,379
Straits Settlements	7,625	11,285	12,881	14,811	11,649	16,508
Australia	1,707	1,462	530	601	687	1,418
All other Countries	7,921	9,974	12,497	12,556	13,839	10,870
TOTAL	399,690	389,185	443,931	321,933	352,985	421,769

XXVIII.—FULLER'S-EARTH (*Sabún-mitti, Multani-mitti, Hind.*).

FULLER'S-EARTH.

[Correspondence File No. 197.]

166. ***OCCURRENCE.***—As regards the distribution of Fuller's-Earth in India, information is very incomplete. It is known, however, to be carried for long distances from certain localities where it occurs, as, for example, in the Bhagalpur Division of Bengal. In the neighbourhood of Colgong, a soap-earth is obtained. In Rajputana a fuller's-earth used to be procured from fissures in quartz and schistose rocks. In some parts of Western Sind a pale-greenish clay is found which is used for washing cloth, etc. In Hyderabad (Sind) there is in fact said to be a fuller's-earth mine situate in the Hala sub-division. In the Panjab, in Dera Ghazi Khan and Multan districts, a clay resembling fuller's-earth is imported from the interior of the Suleman Range and conveyed all over India under the name of *Multani-mitti*. At Nilawan, in the Salt Range, a lavender-coloured clay or decomposed rock is employed by the Natives as a fuller's-earth. Rajputana, especially in the States of Bikanir and Jeysalmir, has rich deposits of fuller's-earth. At Mandhan and Nadai (Jeysalmir) there are two quarries. The clay is found in thin layers. It is carefully extracted and used for washing the hair without any preparation. The *geru* clay also found in that State (to the south-east) occurs in small lumps. These are used by the *Sadhus* to dye their cloths and by the Government to dye tent cloth. *Seri-mitti* is also met with. This exists as lumps that are regularly collected and used in white-washing houses. The production of fuller's-earth from the Bikanir mines was in 1895 39,723 tons, valued at ₹15,332. The quarry at Meth in Bikanir is 36,000 feet long, 18,000 feet wide, and 8 feet deep. It has been in existence a long time and will last for an indefinite period. The quarry is worked by pick-axes. The quantity excavated annually is not fixed, but varies according to demand. About 2,000 camel loads are usually carried annually to Sirsa.

167. ***Soapsand*** is found in Burma, in the Myingyan district. The production in 1894 was 190 tons. The production in 1895 was 197 tons, valued at ₹498. The rise in value is due to a better quality of soapsand having been obtained during the year. In 1896, 169 tons, valued at ₹240, were produced. The fall in price is stated to have been due to less demand.

Most of these clays are employed for cleaning the hair, dyeing cloths and weighting paper, but in Manipur a clay of a similar nature is spoken of as edible.

XXIX.—MINERAL PAINT and OCHRE (*Gerú, Hind.*).

MINERAL PAINT.

168. ***OCCURRENCE.***—Mineral paint of a slatish colour is found in a vein technically termed "fault" commencing from the northern extremity of the Kishengarh hill in Rajputana, and extending, at

Correspondence File No. 197.]

MINERAL PAINT.

least so far as has been hitherto ascertained, for several miles in the north-easterly direction. It has been found to be a good substance for painting wagons, iron work, iron bridges, etc., and the sides of ships. As it has been found by an analysis in the Geological Survey Department of the Government of India to contain very little iron, and the iron being in the state of peroxide, there is no further room, it is stated, left for oxidation or rusting. Samples have been sent to various places both in England and India, but no market has as yet been created for it. It has, however, been approved by the Rajputana-Malwa Railway, and a small paint-manufacturing machine has been erected at their workshops for making paint of the mineral.

169. ***OCHRE.***—Found in parts of the Meywar State, Rajputana. In 1894, three and a half tons were obtained, valued at ₹5, in 1895, 17 cwt., valued at ₹1-4, and in 1896, 71 lbs., valued at ₹50. In Hyderabad Deccan, red ochre is met with. The quantity produced in 1894 was valued at ₹28, and that for 1895 at ₹30. It is explained that the quantity cannot be stated as the mines are given out on contract. Red ochre is also found at Boraundha in Bundelkhand, Central India Agency, where the outturn in 1894 was estimated at 13 tons, value ₹62, and in 1895, at 5,673 tons, valued at ₹681-12. The return furnished for last year is blank. Figures showing quantity for all India are not available. In the Bellary district of the Madras Presidency red, brown, yellow, and purple ochres, large in quantity and of excellent quality occur in the ferruginous schist bands of these regions. Ochres are also met with in Trichinopoly and the Nilgiris. *Prov. Index (Madras), p. 17.*

SODA SALTS.

XXX.—SODA SALTS (*Khari-nun; and Sajji, Hind.*) (Other than Common Salt).

[Correspondence File No. 197.]

OCCURRENCE.—In very many districts of India Sulphate and Carbonate of Soda are manufactured from the surface soil or saline efflorescence, and the Carbonate as Barilla is also prepared by incineration of certain plants known as saltworts. Of the Madras Presidency it has been remarked under the heading Salem that soda salts occur in every district and especially in dry beds of streams that drain cotton soil areas.—*Prov. Index (Madras), p. 19.*

170. The ***Sulphate*** known as *Khari* or *Khari-nun* or *Chamra-khari* is prepared either by solar evaporation (*abi*) or by the use of artificial heat (*jaria*). The salt known as *patna-khari* is a pure form of sulphate produced by first burning the efflorescence with alternate layers of rice straw, then lixiviating the calcined mass.

Sulphate of Soda, prepared by one or other of these methods, is an article of local trade in Behar, Fattehpur, Etah, Bulandshahr, Hurdui, Patiala, etc. It is chiefly used in hide curing.

171. The ***Carbonate***—(*Sajji*) exists either as natural mineral obtained from saline efflorescence or as Barilla derived from the ashes of certain plants. To obtain the former, shallow basins are formed, about ten yards square. Into these beds water is admitted to a depth of two or three inches. The soda efflorescence of the neighbourhood is then thrown into the water until a thick pasty mass is produced. This is smoothed over and in a week's time a concentrated efflorescence forms on the surface. This is collected by the hand and is known as *papri-sajji*. To make *sajji* the *papri* is again dissolved and boiled in earthen vessels until the impure carbonate forms into a hard mass.

In 1891-92 there were 2,266 works licensed to manufacture *khari*; 1,183 to make *sajji*; and 55 to make *rassi*. During that year 9,150 tons of *khari* and about 6,405 tons of *rassi* and *sajji* were manufactured. The following passage on the manufacture of these crude soda salts may be given:—

"***Khari*** (or sulphate of soda) and *rassi* and *sajji* (or impure carbonates of soda) are prepared by a process very similar to that by which crude saltpetre is produced. The quality of the earth collected is of course different in each case, but the nature of the filters, boilers and pans employed is the same; and for evaporation and condensation of the brine, boilers and *chunam* pans are both used, the former in Behar and the latter in the North-West Provinces and Oudh, where prolonged dry hot weather may be more confidently reckoned on than in Behar. *Patna-khari*, as the *khari* produced in Behar is called, is used chiefly for preserving hides, and also as a cathartic for cattle, and sells at from 8 to 12 annas a maund. It contains very little sodic chloride. *Khari* produced up-country by solar evaporation is much used as a cathartic for cattle. It contains a considerable percentage of common salt (20 to 30, and sometimes even more per cent.), and realises from 12 annas to a rupee per maund. *Rassi* and *sajji* are used by dyers and soap-makers and also by tobacconists as an ingredient in the preparation of *hukka* tobacco. The price ranges from 12 annas to ₹1-4-0 per maund."

172. ***Barilla*** is chiefly manufactured in the Panjab from various plants known generically as *lání*. These are burned in pits in successive relays until a sufficient amount of ash has been accumulated. The ash is then covered with a thin layer of earth to prevent loss by evaporation and is left to cool. After about a week the layer of ash in the bottom of each pit is found to be a hard mass of *sajji*.

173. ***Black Salts.***—(*Kala-nun*) is an article of some importance in local markets in India. It is prepared in Upper India, chiefly at Bhewani in Hissar. Common salt is heated with the chebulic and emblic myrobalans together with *sajji*, until a sort of fusion takes place. The article so manufactured is used as a medicine.

174. ***Phuli.***—"A salt of soda imported into Leh from Changthan, Rupshu, and Nubra in Ladakh. It is very extensively used in Ladakh for mixing with tea to bring out its strength, and for the same purpose is largely exported to Kashmir and a little to Kulu. It is also employed by the Bhotis for washing clothes and for dyeing wool a black colour." During 1895, nearly 45 tons (1,228 maunds, value

₹9,210 are stated to have been imported into Kashmir from Ladakh. The corresponding figures for 1896 are 95 tons, valued at ₹16,279. SODA SALTS.

Although a few of the provincial returns make mention of the soda salts, other than common salt, definite statistics have not been furnished. The above remarks have been thrown together partly to indicate the regions where these salts are obtainable, and partly in order to establish a position where in future Reviews mention may be made of the extent of the traffic in these minerals.

QUARRY STONES AND BUILDING MATERIALS.

CLAY.

XXXI.—CLAY (BRICKS, TILES, POTTERY) (*Chikni-mitti, Hind.*).

[Correspondence File No. 189—1.]

175. ***OCCURRENCE.***—Brick, fire, and pottery clays are pretty generally distributed. The most valuable pottery clays occur in Jabalpur. Clay of a very fine character is also found in Raniganj, Bengal. Large pottery works on the European system have for some years been in operation, both at Jabalpur and Raniganj.

Bengal.—The following particulars have been furnished by the Government:—The estimated production of clays in Burdwan, used by Messrs. Burn & Co. in their Pottery Works, is 16,117 tons, valued at ₹21,440. Production of brick clay at Muzaffarpur is about 52,220 tons, valued at about ₹4,896. The estimated production of clay at Balasore is 700 tons.

It may, however, be remarked that it seems likely that the brick-making in the neighbourhood of Calcutta, on the banks of the Hooghly, is the most important industry of this nature in India. It is to be regretted, therefore, that no statistics have been furnished. The river water is allowed to overflow into specially prepared basins and a deposit of fine clay collected. From this material a very large percentage of the houses of Calcutta have for some years past been constructed. The bricks are for the most part fired in furnaces, not in kilns. The consumption of coal for the brick fields of Calcutta must be no small item in the annual demands of that mineral.

North-West Provinces.—The following places in the North-West Provinces and Oudh are particularly noted for their fine clay suited for pottery:—Aligarh, Muttra, Amroha in Moradabad, Chunar, Azamgarh, Lucknow, and Rampur State. Clays of various kinds are also to be found in the Bundelkhand and Baghelkhand States of the Central India Agency.

Panjab.—The pottery factory, which was started in 1894 at Harnpur in the Jhelum district of the Panjab, is no longer in existence. The pottery of Multan and Delhi are famous. The last mentioned are not, however, constructed of clay but from a powder artificially prepared from certain rocks. Hazara clays, specially the red kind, are recognized as the most useful by some of the potters.

Madras.—There are several works in the Madras Presidency, almost all belonging to Europeans, for manufacturing bricks, tiles, cements, etc. Near Rajahmundry in the Godavari district *kaolin* is reported to exist, of which goglets, some of superior type, are made, but not on a large scale. A small consignment of this clay has, it is said, been exported to England for experimental purposes. A sort of pale clay is reported to be available in Vizianagram and to be used for making pots at the local School of Arts. The clay has been identified to be *kaolin* by Mr. Middlemiss, Superintendent, Geological Survey of India. *Kaolin* is said to be found also in the Nilgiris. In Kistna and Chingleput fine white clays occur. Fine plastic clay, used for making figures, is reported to be found in Cuddalore taluq of South Arcot district. The production of this presidency was in 1895 stated to be 331,624 tons, and during last year 381,085 tons. Pottery clay also occurs in Mercara in Coorg, where tiles and bricks are manufactured by the Mercara Pottery Works. The production of 1896 has been given as 1,925 tons. Pottery clay is also reported to be available in large quantities on paddy lands in Changanacherry in Travancore. It is stated that clay used for making bricks, tiles and pottery is met with in parts of Pudukottai. In Anantapur and Chingleput bangle-earth is found in quantity. The manufacture of bricks and tiles is carried on in Malibar at Calicut and Tirivaloy, clays being obtained from river beds of neighbourhood. At Mangalore in South Canara a large brick and tile factory is carried on by the Basel Mission. There is said to be some eleven factories in the district which turn out bricks, tiles and pottery.—*Prov. Index (Madras), pp. 23, 24.*

Central Provinces.—The most famous clay of these provinces is that of Hoshangabad, especially near Sohagpur. In 1896 it is estimated that the amount utilized in the manufacture of *surais* and other earthen vessels came to 58 tons.

Rajputana and Central India.—In addition to the particulars recorded above under fuller's earth, it may be said that Meywar reports chalk and other kinds of clay for brick, fine pottery and building purposes in many places within the State. Good brick clay also occurs. In Ajmir-Merwara the quantity of clay produced has been returned as (1894) 22,832 tons, valued at ₹2,238, (1895) 23,910 tons, valued at ₹2,350, and (1896) 8,266 tons, valued at ₹790. In Bundelkand the outturn (1896) of yellow clay was 90 tons, valued at ₹912. In Rewah, it is said 14 mines for clay exist, the produce of which in 1895 was valued at ₹1,500. The three mines in Kothi realized ₹1,000. Nagoda produced 80 maunds, valued at ₹25 while in Barundha the production was 124 tons, value ₹350.

Berar.—The production of clay in this province during 1895 was stated to have been 420 tons, valued at ₹210. Figures supplied for 1896 give outturn of 670 tons, valued at ₹335.

CLAYS.

Mysore.—The following statement has been furnished for Mysore :—

	1895.		1896.	
	Estimated Quantity.	Value.	Estimated Quantity.	Value.
	Cwt.	₹	Cwt.	₹
Bangalore	1,096,520	62,850	851,560	58,315
Kolar	383,960	47,995	416,000	52,000
Tumkur	82,710	2,691	77,150	6,460
Mysore	2,293,180	14,335	1,646,130	10,288
Hassan	121,420	7,589	125,680	10,150
Simoga	50,720	755	71,400	1,126
Kadur	239,600	34,115	236,900	36,175
Chitaldrug	314,600	12,365	333,200	13,080
TOTAL	4,582,710	1,82,695	3,758,020	1,87,594

Coorg.—The estimated production in 1896 of clays, stated to be used for manufacture of tiles and bricks, has been returned at 1,925 tons, the value of which is not given.

Burma.—HANTHAWADDY.—The estimated production during 1896 was 73,435 tons, valued at ₹73,435. PEGU.—The estimated production in 1896 was 2,619 tons, valued at ₹3,274. THARRAWADDY.—The estimated production, 1896, was 45,817 tons, valued at ₹64,192. PROME.—The estimated production during the year was 4,063 tons, valued at ₹4,063. PAKOKKU.—The production in 1896 was 564 tons, valued at ₹3,956. MINBU.—The production in 1896 was 3,254 tons, valued at ₹1,446. MAGWE.—The production in 1896 was 3,239 tons, valued at ₹5,074. MYINGYAN.—The estimated production in 1896 (*a*) was 4,522 tons, valued at ₹6,042. The increased production is stated to have been due to the general failure of crops which compelled cultivators to resort to pottery-making to earn their living.

176. ***OUTTURN.***—Statistics of outturn during 1895 and 1896 were available for the following provinces only :—

	1895.		1896.	
	Value. ₹	Quantity. Tons.	Value. ₹	Quantity. Tons.
Madras	Not stated.	331,624	Not stated.	381,085
Bengal	Ditto.	66,276*	Ditto.	69,037*
Burma	1,24,095	108,812	161,482	137,513
Coorg	Not stated.	1,832	Not stated.	1,925
Rajputana	15,810†	39,992	65,987†	38,755
Ajmir-Merwara	2,350	23,910	8,266	700
Mysore	1,82,695	229,135	1,87,594	187,901
Central Provinces	Not stated.	73‡	Not stated.	58‡
Berar	210	420	335	670
Central India	...	...	2,286	193
Tons	802,074		817,837	

* Returns from the Burdwan, Muzaffarpur and Balasore districts.
† Outturns of Jeysalmir and Bikanir States.
‡ „ „ Hoshangabad district.

There are in India some 11 pottery works and 27 tile and cement manufactories. The former give employment to something like 1,985 persons, and the published returns of their manufactures were last year ₹5,00,007, by far the major portion being the Raniganj Pottery Works. The tile and cement works give employment to 5,320 persons, of whom 3,517 are permanently employed, and they turn out goods which last year were valued at ₹6,39,794.

GRANITE.

XXXII.—GRANITE (*Bhurbhura patthar, Hind.*).

[Correspondence File No. 199—2.]

177. ***OCCURRENCE.***—In these returns the term granite is employed for all massive crystalline rocks, such as granite proper, gneiss, etc. Rocks of that nature occur plentifully in Western Bengal, in the Madras Presidency, and in the Central Himalaya. Granite appears to be used exclusively for local purposes. It is less employed than formerly, when it was a favourite stone for monolithic structures. The demand for this stone has, however, increased in the Ganjam and Vizagapatam districts of the Madras Presidency since the East Coast Railway works were opened. Quarrying is briskly carried on all over the district of Cuddapah, where the stone is found in layers at some depth from the surface. It is cut into slabs of required sizes by means of chisels. Granite is also found in Kistna, Bellary, Anantapur, North Arcot, Chingleput, South Arcot, Salem, Coimbatore, Trichinopoly, Madura, Tinnevelly, Nilgiris, Malabar, South Canara, many parts of Cochin and Banganapalle, and in all hilly localities of Travancore, and in some parts of Pudukkottai State.

The following paragraphs have been specially furnished in connection with the returns for 1895 :—

Bengal.—The extent of the occurrence or production of granite cannot be exactly estimated. The stone exported in 1896 by rail in the Gaya district amounted to 5,511 tons, worth ₹9,415. At present the industry is slack. Returns as to the estimated production in the Sonthal Parganas have not been received. In Manbhum the estimated production of rubble stone is 305 tons, valued at ₹115; and of quartz stone, 24,132 tons, valued at ₹3,653.

North-West Provinces and Oudh.—Granite occurs in Banda, Hamirpur, Jhansi, Mirzapur, and Almora, Kumaon. The quantity quarried in 1895 has been reported at 5,732 tons, and in 1896 at 2,063 tons.

(*a*) In last year's Review, the accidental addition of a cypher gives outturn 16,770 instead of 1,677 tons.

Central Provinces.—Granite of good quality occurs in many localities especially in the Jabalpur and Hoshangabad districts. It is dug out by blasting, then broken into small pieces and used for metalling the roads, but occasionally for building purposes. A royalty is realized of 6 annas per 100 cubic feet.

Rajputana.—Jaipore, Kishengarh, Tonk, Kerowlee have nothing further to report than formerly. Bhurtpur believes its previous returns were grossly incorrect.

Coorg.—Granite used for metalling the roads and building purposes.

Burma.—PROME.—Occurs in the Shwedaung sub-division and is extracted by the Public Works Department for metalling roads. The production during the year was 156 tons, valued at R625. TOUNGOO.—The production in 1896 was 2,892 tons, valued at R2,298. MINBU.—Produced in the Salin river and in the Sabwet chaung, in Salin and Minbu townships, is used by the Public Works Department for metalling roads. The production during the year was 788 tons, valued at R1,603. MAGWE.—The outturn during 1896 was 71 tons, valued at R180.

178. ***OUTTURN.***—The following statement compiled from the returns may be given as the production during 1895 and 1896:—

	1895.		1896.	
	Quantity. Tons.	Value. R	Quantity. Tons.	Value. R
Bengal	55,926*	Not stated.	29,948	13,183
North-West Provinces and Oudh	5,732	Ditto.	2,063	Not stated.
Central Provinces	364 †	Ditto.	Not stated.	Ditto.
Berar	162,349	3,812	99,761	2,227
Central India	Not stated.	Not stated.	Not stated.	Not stated.
Rajputana	9,528 ‡	4,823	6,402‡	5,132
Ajmir-Merwara	35,050	7,000	11,745	2,300
Madras	667,435	Not stated.	442,361	Not stated.
Bombay	Not stated.	Ditto.	Not stated.	Ditto.
Mysore	223,704	4,49,200	210,603	4,24,616
Coorg	5,568	10,704	15,648	40,944
Burma	4,407	5,955	3,907	4,706
Tons	1,170,063		822,498	

* Outturns of Gaya, Sonthal Parganas and Manbhum.
† „ Hoshangabad district.
‡ „ Tonk and Kerowlee States.

XXXIII.—LATERITE.

179. ***OCCURRENCE.***—Laterite occupies an important position in the superficial geology of India and is widely distributed throughout the Peninsula. [Correspondence FII No. 199—3.]

Bengal.—The estimated production of laterite in Midnapore was 8,548 tons, valued at R563. The estimated production in Monghyr is 17,153 tons. For Cuttack the production came to 14,839 tons, valued at R14,229. It has been largely used in canal works as well as for building purposes and metalling roads. The estimated production of laterite in Balasore was 2,500 tons.

Central Provinces.—Is abundant in these provinces as, for example, in Jabalpur and Hoshangabad. It is excavated by manual labour and is used for metalling roads. A royalty of one anna per 100 cubic feet is realized.

Rajputana.—The outturn in Bikanir was last year 74,202 tons, valued at R46,903.

Madras.—Laterite is reported to occur in Ganjam, Godavari, Kurnool, Bellary, North Arcot, Nellore, Chingleput, Salem, Trichinopoly, Tanjore, Madura, Nilgiri, Malabar, South Canara, and the Travancore and Pudukkottai States. The outturn in the Madras Presidency for 1896 is given below.

Burma.—HANTHAWADDY.—The estimated production in 1896 was 33,782 tons, valued at R31,674. The variations in the value are due to the different rates at which laterite is valued in different parts of the district. PEGU.—The estimated production in 1896 was 902 tons, valued at R2,494. THARRAWADDY.—The estimated production in 1896 was 2,008 tons, valued at R3,639. PROME.—The estimated production in 1896 was 1,433 tons, valued at R2,329. PAKOKKU.—Estimated outturn in 1896 was 597 tons, valued at R895. MINBU.—The production during the year was 1,669 tons, valued at R1,715. MAGWE.—The production in 1896 was 3,364 tons, valued at R3,297. MAUNGMYA.—Estimated production in 1896 was 6,069 tons, valued at R607. TOUNGOO.—Occurs in the Shwegyin sub-division over a large area extending for over half a mile to the north and east of the jail. Quarrying is done by digging with pick-axes and by removing blocks from the earth with crowbars, dressing being done by steel blades fitted on to hammers. The industry is in a flourishing state, and at present an average of 54 cubic feet is extracted daily. The production during the year was 1,590 tons, valued at R2,400.

180. ***OUTTURN.***—The estimated total production in 1895 and 1896, available for the following provinces only:—

	1895.		1896.	
	Quantity. Tons.	Value. R.	Quantity. Tons.	Value. R
Madras	5,194,550	Not stated.	5,401,780	Not stated.
Bengal	47,882*	Not complete.	43,040*	Not complete.
Burma	37,882	55,677	51,414	49,050
Coorg	128	128	149	149
Mysore	231,952	1,83,884	201,750	1,84,569
Rajputana	92,885	44,503	74,202	46,903
Berar	680	340	540	270
Central Provinces	625†	Not stated.	2,325†	Not stated.
Tons	5,588,584		5,775,200	

* Does not include gravel.
† From Hoshangabad district only.

XXXIV.—LIMESTONE (*Chúná, phúnkne-ka kankar, Hind.*).

[Correspondence File No. 199—4.]

181. ***OCCURRENCE.***—Marble (*marmar*), dolomite, serpentine, *kankar*, etc., one or other can hardly be said to be absent from any of the Indian geological formations. They occur in almost all the districts of Madras Presidency. In the Manbhum, Singbhum, Lohardaga, and several other districts of Bengal. In the Khasi and Jaintia Hills, Assam. In the Sambalpur, Raipur, Jabalpur, Nagpur, and Wardha districts of the Central Provinces. They are frequent in the Bombay Presidency and Sind, particularly Kathiawar. Excellent limestone is also met with in Burma, Mysore, Hyderabad, and Baroda.

The best limestone and marble is probably that met with in the northern part of the Jabalpur district. But good limestone also occurs in the Vindhyan range, in the following Native States in the Central India Agency :—Bundelkhand, Baghelkhand, and Bhopawar ; and in several of the Native States in Rajputana, Makrana being the chief. Within a radius of eight miles around Makrana there are something like one hundred quarries. But of these only some fifteen are at present worked.

The Makrana quarries vary in depth from 30 to 75 feet, and follow the lead of the vein. The marble is excavated by blasting, and is then cut into the required sizes by means of steel saws. It is hauled to the surface on wooden rollers by manual labour, the chips and dust are burnt into chunam, and used for the finer kinds of plastering. The quality of the stone is generally better according to the depth it is worked out, but, owing to the rude appliances used for hoisting it to the surface, it is impossible to work to any great depth. The rates levied by the Marwar Darbar are as follows :—

R1 per maund up to 10 maunds, and 4 annas per additional 2½ maunds.
R2 per maund on all articles such as cups and plates cut from the stone.
R2 per cart-load on coloured marble which is inferior to the white stone.

The revenue derived from the quarries is credited to His Highness's privy purse. From statistics it would appear that the output is declining, which may be accounted for by bad seasons and the demand having lessened owing to the marble quarries started in the Jaipur State. The railway which has been opened through Makrana will, however, certainly give an impetus to further excavation, unless the opinion that the quarries are nearly worked out, expressed by Mr. Foote, the Geological Superintendent of the Baroda State, be found correct.

The limestones of the Bombay Presidency and Sind, particularly that from Jhalawad Prant and the south-west coast of Kathiawar, are admirably suited for building purposes. The Porbundar miliolite and the grey sandstone of Dhangadra are perhaps the best known. The former has recently been conveyed all the way from Kathiawar to be used in the construction of buildings in Calcutta.

182. ***QUARRIES.—Madras.***—The limestones of this Presidency are, for the most part, collected from the surface ; occasionally they are dug out of the earth. The production in 1896 is given at 698,930 tons.

Bengal.—In Bengal, some of the quarries are worked with pick-axes and blasting, while in others the stone is excavated by hand labour, or dragged up from the beds of rivers. The production of the Sonthal Parganas in 1895 was 7,000 tons ; Cuttack, 35 tons ; and Balasore, 2,411 tons. In 1896 the estimated outturn is stated to have been—Monghyr 28,016 tons ; Muzaffarpur 13,039 tons, valued at about R8,964 ; Cuttack 3,645 tons, valued at R8,256 (the returns are probably for lime) ; Balasore 2,400 tons and Manbhoom 1,334 tons, valued at R2,668 (probably for lime).

Central Provinces.—Limestone is quarried at Jabalpur by means of blasting ; it is then burnt in lime kilns. In Hoshangabad limestone occurs all over the district : the production last year was estimated at 346 tons.

Central India.—The production at Panna was last year 565·02 tons, valued at R763. In Rewah one quarry in Pargana Madhogarh worked by Sutna Stone and Lime Company, Limited, who paid R1,200 on 303,033 cubic feet of limestone despatched during the half-year ending 30th June 1896. The quantity produced at Nagode was 1,098 tons, valued at R3,000. Limestone occurs in Bag, Ali Rajpur and Jhabua (Bhopawar).

Rajputana.—In addition to the particulars published in former reports as to the limestone of Jaipur, Kishengarh and Jeysalmir, it may be remarked that the stone from Jajia is similar to Dabhla stone. Quarries are 7 *kos* distant from Jeysalmir. Used for the tops of *chatrees* and domes of temples. The production in 1896 was 2,190 tons and value R1,931. The outturn for 1896 in Jaipur and Kishengarh has been returned separately as under :—

Jaipur—32,420 tons, valued at R37,789, quarried during the year.
Kishengarh—500 maunds or 18·3 tons quarried and worked during the year. Value not stated.

The largest quantity (87,598 tons) of marble-stone was obtained in Bikanir, but the largest revenue R89,525) was derived from the stone from Ulwar. SIROHI—2,505 tons found in the vicinity of Morthala siding. Quantity at other places cannot be ascertained on account of contract system. MARWAR.—Total production of marble-stone during 1896 was 298 tons. Returns were forwarded from ten districts last year and the value of the stone amounted to two lakhs.

Baroda.—The quantity and value of the limestone found in Sangir quarry in Sankheda taluqa was, in 1895, 1,600 tons, valued at R100. The return for 1896 is marked *nil*.

Burma.—MYAUNGMYA.—The outturn of burnt lime during the year was 4,498 tons, valued at R19,740. AMHERST.—The production during 1896 was 4,000 tons, valued at R6,000. BHAMO.—Found in both first and second defiles in large quantities. The extent of occurrence is practically unlimited in

quantity, the whole of the defiles being composed of rock, much of which is limestone. In the second defile lime is made from limestone and sold chiefly to the railway. The limestone in the first defile is broken up and used for road-metalling. The industry is reported to be improving. The production in 1896 was 1,044 tons, valued at R2,284. SHWEBO.—The outturn in 1896 was estimated at 1,600 tons, valued at R1,200. SAGAING.—The estimated production in 1896 was 2,907 tons, valued at R1,565. PAKOKKU.—Limestone exists in the Salé, Seingan, Myaing, Myotha, Chaungsôngyi, and Chauktaung circles of the Myaing township and is quarried from Kyibingôn, and Tanwegan villages. The outturn per kiln is about 200 baskets a month in the dry weather and 100 baskets a month in the rains. The kiln consists of a pit 9 feet deep, with a diameter of 6 feet at the base and 4½ feet at the mouth, and at a height of 3 feet from the bottom, a ridge 6 inches wide and gradually decreasing upwards encircles the pit. At a distance of 10½ feet from the mouth of the pit a hollow passage, 6 feet in diameter, is tunnelled to the bottom of the pit where it meets a firehole 1½ feet in diameter. The limestone is quarried in the above mentioned localities and conveyed to the kiln in carts. One cart makes two trips a day to the kiln; once in the morning and once in the evening. A cart-load is estimated at 5 basketfuls. At the end of five days, or when 10 cart-loads have been brought to the kiln, the stone is broken up into conveniently-sized lumps and arranged one over the other, on the inner ridge, arch-ways towards the mouth of the pit, which is surrounded with a stone parapet about 3 feet high. Firewood is then taken down the tunnel and placed in the bottom of the pit through the fire-hole and a fire kindled under the limestone. This is kept burning for two or three days and when the kiln is cool the burnt stone is raked up through the tunnel and 50 or 60 pots of water are emptied on the burnt stones. The water causes the stones to crack and crumble into powder and this powder is lime. The annual outturn from both Kyibingôn and Tanwegan is only 2,500 baskets, and 50 baskets of lime, respectively; the outturn of one kiln sells for R17 to R18. The outturn during the year was 121 tons, valued at R490. MINBU.—The production during the year was 2 tons, valued at R42. MAGWE.—The production during the year was 1,998 tons, valued at R6,858. Fall in price, due to less demand. THAYETMYO.—The outturn in 1896 was 802 tons, valued at R315. It is reported that the value given in 1894 cannot nave been correct as the real value was the same as in 1895. MYINGYAN.—The outturn in 1896 was 86 tons, valued at R700.

Assam.—There are two centres of production, Lakhimpur and the Khasi and Jaintia Hills. The former yielded last year 1,619 tons, valued at R33,860 (selling price at Dibrugarh), and the latter 74,380 tons, valued at R48,078 (estimated value at quarry). The following notes have been furnished regarding these Assam limestones:—

LAKHIMPUR.—The Doms near Sadiya are the only people who collect stones. They go in boats for the purpose of fishing and collecting limestone for themselves and for Marwari merchants. They return as soon as their boats are fully loaded. They do not reduce the stones to lime, but sell them at Sadiya. Although the quantity of lime collected has not increased during the year, the present state of the industry (if the small operations dealt with deserve this name) is reported to be prosperous. As a matter of fact, however, the local supply cannot compete with that obtained from the Khasi and Jaintia Hills.

KHASI AND JAINTIA HILLS.—Some of the quarries are worked under leases issued by Government for various periods, and some under permits issued annually by Government to applicants for quarrying and removing limestone. In some quarries, the limestone is detached by blasting with dynamite and gunpowder and the boulders are then split and broken with Native crow-bars and hammers, while in others no dynamite is used, the limestone being workable without blasting. The present state of the industry is dull, as both the outturn and price have fallen considerably. During 1895, no large traders came to purchase and remove limestone from the quarries. Messrs. Inglis & Co., who have a monopoly of the limestone business at Shella, did not purchase much limestone during 1895, as they had already in stock 3 to 4 lakhs of maunds of limestone unsold at Chhatak.

It may be remarked that to a very large extent the quarries here dealt with meet the demands of Calcutta for lime.

MANIPUR.—The lime quarries of the State meet all the local demands. Outturn reported for last year, 347 tons, value at quarry R1,301.

183. *Kankar.*—Limestone in the nodular form known as *kankar* occurs in Bengal and almost all over the North-West Provinces, and is very largely used for making lime and metalling roads. There are fifteen *kankar* quarries in the Muzaffarpur district of Bengal, of which the most important are at Chandrutti, Kudaria, Harawli, and in the bed of the Khanow and Gundak rivers. The outturn in 1896 was estimated at 13,039 tons, valued at about R8,964. In Monghyr the outturn was 28,016 tons and in Manbhum, 40,144 tons, valued at R1,371.

The estimated production in Cuttack during 1895 is 3,646 tons, valued at R8,256. It is considered that these returns are probably for lime. The estimated outturn in Balasore for 1896 is 2,400 tons

It is also met with in the Gwalior, Baghelkhand, Bag, Ali Rajpur, and Jhabua States of the Central India Agency. The outturn in 1894 was estimated for the Gwalior States at 1,420 tons, value R13,616. Returns for 1895 show a valuation of R4,395. Figures furnished for 1896 are 29,455 tons, value R14,011. In Bhurtpur (Rajputana), this form of lime is regularly collected, but no returns of the amount have been furnished.

LIMESTONE.

184. ***OUTTURN.***—The estimated production during 1895 and 1896 was :—

	1895.		1896.	
	Quantity.	Value.	Quantity.	Value.
	Tons.	₹	Tons.	₹
Madras	651,661	Not stated.	698,930	Not stated.
Bengal	82,532	9,898*	48,434	19,888**
Burma	11,875†	26,959†	17,058	39,194
Assam	62,788	69,857	76,346	83,239
Mysore	75,927	1,57,144	55,404	1,33,228
Rajputana	190,756	1,79,412	187,411††	2,17,539
Central India	963‡	3,055‡	31,118	18,974‡
Ajmir-Merwara	9,964	1,295	1,968	272
Baroda	1,600	100	*Nil.*	*Nil.*
Berar	1,414	1,267	928	832
Central Provinces	304§	Not given.	346§	Not given.
Tons	1,089,784		1,117,943	

SANDSTONE.

XXXV.—SANDSTONE (*Ret-patthar, Hind.*).

[Correspondence File No. 199—6.]

185. ***OCCURRENCE.***—Several of the recognized formations in India, *viz.*, the Vindhyan and Gondwana, cretaceous and tertiary, afford sandstones admirably suited for building, and some of them have from very early times been largely drawn upon for the supply of materials for that purpose. The Vindhyan formation stands pre-eminent, its stones having been used for many centuries in the construction of the forts, palaces, and sacred edifices of Dehli, Agra, and Northern India. Sandstone is obtainable in the Ganjam, Vizagapatam, Godavari, Anantapur, Kistna, North Arcot, South Arcot, and Tinnevelly districts of the Madras Presidency; in the Nimar, Chhindwara, Jabalpur, and Saugor districts of the Central Provinces and in the Agra, Muttra, Jhansi, Hamirpur, Banda, Allahabad, Mirzapur, Dehra Dun, Kumaon, Sultanpur, and Garhwal districts of the North-West Provinces. Chunar in the Mirzapur district is particularly famous for its fine sandstone. Sandstone is found in the Manbhum, Shahabad, Monghyr, and Cuttack districts of Bengal, in the Baghelkhand and Bhopawar States of the Central India Agency, and in the several States of Rajputana, of which the Tonda hills in Kishengarh produce beautiful quartz crystals, but there is no trade in them. All the hills in Kishengarh belong to the transition series, and supply sandstone for building purposes. Very large and durable slabs and beams are found in certain quarries near the town of Kishengarh. These slabs are greatly prized for roofing purposes, and there is a large trade in them. The quarries are worked by a class of Brahmins called Neharaj or Mohobrahmans. The sandstone quarried in Rajputana during 1896 realized 2·82 lakhs.

Sandstone is also found in the Shwebo and Myingyan districts of Upper Burma and in the Hyderabad State. In Bengal, sandstone is worked by quarrying; the present state of the industry is said to be normal.

The following notes may be given from the provincial reports of 1896 :—

Bengal.—The estimated production in Monghyr is 12,143 tons. No returns have been received regarding the estimated production in the Sonthal Parganas. In Manbhum the estimated production of sandstone is 332 tons, valued at ₹330. In Cuttack the yield was 13,020 tons, valued at ₹4,857.

North-Western Provinces and Oudh.—Sandstones are found in Agra, Muttra, Jhansi, Hamirpur, Banda, Allahabad, Mirzapur, Dehra Dun, Kumaon, and Garhwal. Chunar in the Mirzapur district is particularly famous for its fine sandstone. The quantity worked in 1895 is estimated at 164,616 tons and in 1896 at 150,818 tons.

Central Provinces.—It is plentiful in Jabalpur district. The stone is extracted by means of blasting and is then dressed. Undressed stones are used in the foundations of buildings. A mine in the Jabalpur tahsil has been leased. Sandstone occurs all over Hoshangabad, the production last year having been 232 tons.

Central India.—Reported to occur at Panna in Bundelkhand. Outturn in 1896, 426 cubic feet, or say 30 tons, value ₹26, also at Nimkhera and Jobat (Bhopawar).

Baroda.—The quantity and value of the sandstone found in Songir hills in Sankheda taluqa was last year 1,165 tons, valued at ₹1,954.

At Songir there are four quarries working out building materials and two are turning out mill-stones. From 200 to 300 persons, including women and children, work in these quarries in the open season. The wages ordinarily paid are annas 3 per man, annas 2 per woman and anna 1-6 per boy or girl. Those employed in blasting earn annas 6 a day, and those who prepare mill-stones earn annas 8. There is also a stone quarry

* Value given for only 68,705 tons.
† Figures for Pakôkku not given.
‡ Quantity and value of Panna and Nagode given as well as value only from Indore.
§ Figures for Hoshangabad district only.
** Value for 18,018 tons only.
†† Does not include 18·3 tons quarried at Kishengarh, the value of which is not given.

at Molipura. The dimensions of it are 500 feet long and 150 feet wide, and the excavation extends to a depth of 15 feet. 26,755 cubic feet of green marble and 36,665 cubic feet of ordinary stone are stated to exist of an approximate value of ₹55,343. SANDSTONE.

Rajputana.—Further than giving the production for the year 1896 no additional information has been furnished as to the sandstones of Jaipur, Kishengarh, Jeysalmir, Marwar, Ulwar, Kotah, Jhallawar Bikanir, Kerowlee, and Dholepur. "There is an inexhaustible supply of laminated sandstone. The stone is red, white and speckled. It is quarried in massive slabs, which can be split to any required size. The value shown corresponds to the royalty and duty received by the State for stone quarried and sold; it does not include the cost of quarrying, carrying, etc., and stone quarried free for State use has not been valued. The following returns have been received for 1896:—Jaipur, 44,129 tons, valued at ₹30,971, quarried during the year. Kishengarh, 11,240 maunds or 411 tons, quarried and worked during the year. Ulwar, however, heads the list with 86,188 tons of stone which sold for ₹1,53,329.

Madras.—Available in large quantities in ten villages over an area of 30 square miles in the Sivaganga zemindari of Madura. The production in 1896 is given at 531,367 tons.

Burma.—SHWEBO.— The estimated production in 1896 was 2,600 tons, valued at ₹2,437, the same as last year.

MYINGYAN.—The estimated outturn during the year was 20 tons, valued at ₹20.

MINBU.—Produced in the hills west of Minbu. Large quantities can be had, but the production during the year was limited to 447 tons, valued at ₹452. There is no special method of working this mineral. It is used chiefly by the Public Works Department for metalling roads.

PAKÔKKU.—Is found in the Yesagyo township over an area of half a square mile. The stone is quarried in large blocks from the hill-side and is fashioned by friction into slabs for flooring and building, coping for wells, etc. During the year the production was estimated at 560 tons, valued at ₹7,360, and the trade is reported to be flourishing.

186. ***OUTTURN.***—The estimated production in 1895 and 1896 was :—

	1895.		1896.	
	Quantity. Tons.	Value. ₹	Quantity. Tons.	Value. ₹
Madras	324,391	Not stated.	531,367	Not stated.
Bengal	79,544*	Not complete.	25,495*	Not complete.
North-West Provinces and Oudh	164,616	Not stated.	150,818	Not stated.
Central Provinces	2,087	Ditto.	232‡	Ditto.
Burma	2,620	2,457	3,627	10,269
Ajmir-Merwara	28,198	14,305	2,202	1,205
Mysore	26,000	13,000	51,412	25,732
Rajputana	189,681	1,30,694	219,130	2,82,897
Central India	445†	Not stated.	30	26
Baroda	1,200	3,600	1,105	1,954
Tons	818,782		985,478	

XXXVI.—GRAVEL and RUBBLE. GRAVEL.

[Correspondence File No. 199—6.]

187. In one or two of the provincial returns the production of gravel is quoted for the most part along with laterite, other instances under sandstone or trap. It is thus impossible to be sure of the accuracy in separating these, and it would seem desirable that in future returns gravel and rubble should be given independently of the nature of the rocks from which they may have been derived. Roughly speaking, gravel and rubble are naturally formed metalling stones mixed with sand.

Of Bengal it was stated that the production of gravel in 1896 came to 12,530 tons, valued at ₹7,152. So again under sandstone Bengal returns 5,605 tons of rubble, valued at ₹2,245.

Burma furnishes the following particulars of gravel :—PAKÔKKU.—Gravel, including stone for metalling, is obtained from a low range of hills about 1 mile to the north of Pakôkku town. The quarries are scattered among the hills to about 2 miles north-west of the town. The gravel is excavated and placed in carts as it is required and the supply is unlimited. The cost of excavating is about ₹1 per ton. Very little of this metalling material is used and the industry is not flourishing. Returns for 1896 show a production of 112 tons valued at ₹112.

XXXVII.—SLABSTONE. SLABSTONE.

[Correspondence File No. 199—7.]

188. ***OCCURRENCE.***—Is met with in the Gulburga district of the Nizam's Dominions. The estimated production for 1894 is valued at ₹3,950; in 1895, ₹2,870; and in 1896, ₹2,922; the quantity cannot be given, as the working of the quarries is on contract.

XXXVIII.—SLATE (*Shail, Hind.*). SLATE.

[Correspondence File No. 199—8

189. ***OCCURRENCE.***—Slate occurs in the Cuddapah, Kistna, and Kurnool districts of the Madras Presidency. There are no true slates in the Madras Presidency, that is approaching the roofing slates of commerce. Slabby states are procurable, but not of large size. Occasionally slaty flags of tolerable size are obtainable. *Prov. Index (Madras), p. 35.* Samples of slate are found near the villages of Mohari and Belgoa in the Saugor district of the Central Provinces in the vicinity of the Cawnpore road. In the Bagalkote taluq of Bijapur a hard rock occurs, which is prized as a building stone. Slate is also found

* Does not include rubble.
† Calculated on the ratio of production in 1895.
‡ Hoshangabad district only

SLATE. in Jamalpur and Dhararah hills near Monghyr and in the Kymore hills in Shahabad (Bengal); in the Banda, Jhansi, Dera Dun, Kumaon, and Garhwal districts of the North-West Provinces; in the Simla and the Kangra districts of the Panjab; and in the Jaipur, Ulwar, and Dholepur States of Rajputana. Metamorphic black slate is stated to occur in the Nemkhara Bhumiat in the Bhopawar States of the Central India Agency.

The stone is used for buildings, flagging and other masonry structures, but not extensively, as it cannot be easily split into thin slabs.

The following passages may be given from the provincial returns of 1896:—

Bengal.—The estimated production in Monghyr is 1,068 tons.

Central Provinces.—A quarry exists near the village of Kuan in Jabalpur district, but has not as yet been regularly worked.

Rajputana.—Quarries exist in Jaipur, Ulwar, Bundi, Tonk, and Dholepur. In Jaipur 8,069 tons, valued at ₹31,416, were quarried during the year 1896.

Central India.—Metamorphic black slate occurs in Nemkhera, Bhopawar State.

190. ***OUTTURN.***—The estimated production in 1895 and 1896 has been furnished for the following:—

	1895.		1896.	
	Quantity.	Value.	Quantity.	Value.
	Tons.	₹	Tons.	₹
Madras	5,635	Not stated.	5,333	Not stated
Bengal	38,880	Ditto.	1,068	Ditto.
Mysore	36	20	Not stated.	Ditto.
Rajputana	14,664	14,356	35,724	38,833
Tons	59,215		22,125	

XXXIX.—TRAP.

TRAP. [Correspondence File No. 199—9.]

191. ***OCCURRENCE.***—This section has been made to include basalt and other massive compact crystalline black or dark-coloured rocks, and occurs chiefly in the Bombay Presidency, Western Bengal, and the Central Provinces, where samples of trap are found all over the Saugor and Mandla districts. The mines at Jamalpur and Dhararah hills in Bengal are worked by Messrs. Stevens, Ambler & Co. It is also found in the Godavari, Kistna, and Trichinopoly districts of the Madras Presidency, and in the north and south-western parts of His Highness the Nizam's Dominions. In Jhabua territory, Bhopawar, Central India Agency, trapstone is said to be used for building purposes, but returns of production are not given.

The following passages may be quoted from the provincial returns for 1896:—

Bengal.—In the Sonthal Parganas the estimated outturn of trap is 5,088 tons. The estimated production in Manbhum is 797 tons, valued at ₹1,446 (?). In the previous year the production was 1,223 tons, valued at ₹50 only.

Madras.—Found in one village in the Kalla Kurchi taluq, South Arcot district, but not used for any purpose.

Mysore and Coorg.—Used for metalling roads.

Rajputana.—BHURTPUR.—A kind of trap is used as a building stone, but the value *in situ* is inappreciable.

Central India.—Trap is found in many parts of this Agency. There is excellent building stone at Burwani, and at Dhar there is a good red building stone.

187. ***OUTTURN.***—The outturn during 1895 and 1896 is available for the following provinces only:—

	1895.		1896.	
	Quantity.	Value.	Quantity.	Value.
	Tons.	₹	Tons.	₹
Madras	7,301	Not stated.	8,827	Not stated.
Bengal	4,902	50*	5,885	Not complete.
Berar	16,348†	...	91,509	21,537
Mysore	30	235	35	250
Tons	28,581		106,256	

XL.—OTHER KINDS.

OTHER KINDS. [Correspondence File No. 199—10.]

192. ***OCCURRENCE.***—The returns furnished under this heading include what are designated as jungle and rough stone, hard stone, blue stone, and white stone, etc. The estimated production during 1895 and 1896 was as follows:—

	1895.		1896.	
	Quantity.	Value.	Quantity.	Value.
	Tons.	₹	Tons.	₹
Madras	59,424	Not stated.	35,764	Not stated.
Berar	4,444	1,850	Return blank.	Return blank.
Central India	42,140	6,589	18,410	9,486
Rajputana	81,655	44,865	17,315	1,881
Ajmir-Merwara	...	...	55‡	375
Mysore	12,531	13,315	7,223	11,698
Tons	200,194		78,767	

* Value of 1,223 tons.
† Estimate for Akola, Amraoti, and Ellichpur districts only.
‡ ,, Ghantah quarries in Sawar (Kekri Circle).

STATEMENT No. I.

Showing the Production of the Minerals (Salt, Coal, Iron, and Petroleum) for which Statistics are available for the Calendar year 1896.

STATEMENT No. I.

Showing the Production of Minerals for which Statistics are available for the Calendar year 1896.

SALT.

PROVINCE.	1896.		1895.		Average of the three years 1893 to 1895.		Percentage on weight of increase or decrease in 1896, compared with	
	Weight in tons.	Value.	Weight in tons.	Value.	Weight in tons.	Value.	1895.	Average of 1893 to 1895.
British Provinces.		₹		₹		₹		
Madras	347,545	*20,01,968*	326,905*	*18,62,640*	307,514	*18,15,789*	+6·31	+13·01
Bombay including Sind†	351,366	*11,06,093*	419,417	*15,41,046*	391,816	*15,12,522*	−16·22	−10·32
Bengal	8,507	*59,636*	7,663	*56,204*	6,004	*44,644*	+11·01	+41·68
North-West Provinces and Oudh.	1,152	*9,154*	1,344	*13,775*	1,198	*12,266*	−14·36	−3·92
Panjab	114,650	*5,56,223*	105,688	*4,98,243*	105,049	*4,64,355*	+8·47	+9·13
Central Provinces	...	...	...	...	...	...	...	...
Assam	...	...	...	...	...	...	...	...
Burma	17,365	*6,67,631*	19,245	*7,73,592*	16,681	*7,12,098*	+9·76	+4·10
Aden	44,311	*2,62,757*	2,9,554	*1,74,188*	42,669	*2,52,871*	+49·93	+3·84
Total	884,896	*46,63,462*	909,816	*49,19,688*	870,931	*48,14,545*	−2·73	+1·60
Native States.								
Mysore	...	...	...	...	...	...	...	...
Kashmir	1	*40*	No returns	*40*	No returns	*57*	...	...
Baluchistan	...	...	...	...	...	...	...	...
Central India Agency (Gwalior).	1,049	*Not stated.*	694	*Not stated.*	653	*Not stated.*	+51·1	+60·64
Rajputana States	135,057	*7,54,757*	248,723	*14,60,051*	223,732	*15,21,125*	−45·69	−39·63
Cutch and Kathiawar†	5,741	*61,025*	4,580	*53,592*	4,296	*45,507*	+25·34	+33·63
Nizam's Dominions	...	...	...	...	...	...	...	...
Total	141,848	*8,15,822*	253,997	*15,13,683*	228,681	*15,66,689*	−44·15	−37·97
TOTAL BRITISH PROVINCES AND NATIVE STATES.	1,026,744	***54,79,284***	1,163,813	***64,33,371***	1,099,612	***63,81,234***	−11·77	−6·62

* The figures published in last year's review were 266,222 tons valued at ₹15,55,211, but these were subsequently corrected as above.
† The returns of Cutch and Kathiawar have been isolated from the provincial figures.

STATEMENT No. I.

Showing the Production of Minerals for which Statistics are available for the Calendar year 1896.

COAL.

PROVINCE.	1896.		1895.		Average of the three years 1893 to 1895.		Percentage on weight of increase or decrease in 1896, compared with	
	Weight in tons.	Value.	Weight in tons.	Value.	Weight in tons.	Value.	1895.	Average of 1893 to 1895.
British Provinces.		₹		₹		₹		
Madras . . .	...	...	1,737	8,685	1,192	6,405	...	...
Bombay including Sind.	...	...	...	...	...	...	...	...
Bengal . . .	3,037,920	81,46,411	*2,716,155	*86,03,205	2,218,318	66,34,301	+11·84	+36·94
North-West Provinces and Oudh.	1,000	*Not stated*	...	...	...	...	...	...
Panjab . . .	79,017	6,59,640	72,493	5,86,275	72,084	5,73,199	+8·99	+9·61
Central Provinces .	141,185	6,67,289	122,776	6,39,536	132,796	6,38,049	+14·98	+6·31
Assam . . .	177,259	12,35,052	172,717	12,08,375	168,861	11,81,672	+2·62	+4·97
Burma . . .	22,993	1,01,455	17,289	95,089	13,112	89,561	+32·99	+75·35
Total .	3,459,374	1,08,09,847	3,103,167	1,11,41,165	2,606,363	91,23,187	+11·47	+32·72
Native States.								
Mysore . . .	...	...	...	...	...	...	...	...
Kashmir . . .	...	...	...	...	...	...	...	...
Baluchistan . .	10,572	1,48,555	23,259	3,08,288	21,617	2,73,630	—54·54	—51·09
Central India Agency	115,386	3,82,485	118,479	4,06,697	115,221	4,02,017	—2·61	+0·14
Rajputana States .	...	...	...	...	...	...	...	...
Nizam's Dominions .	262,681	9,19,383	292,915	10,25,202	230,287	8,06,004	—10·32	+14·06
Total .	388,639	14,50,423	434,653	17,40,187	367,125	14,81,651	—19·58	+5·86
TOTAL BRITISH PROVINCES AND NATIVE STATES.	3,848,013	**1,22,60,270**	3,537,820	**1,28,81,352**	2,973,488	**1,06,04,838**	+8·76	+29·41

* Last year's Review gave an output for Bengal during 1895 of 3,550,069 tons, value R1,02,42,689, but these figures were subsequently revised and given as 2,716,155 tons, value R86,03,205, as shown above.

STATEMENT No. I.

Showing the Production of Minerals for which Statistics are available for the Calendar year 1896.

IRON ORES.

PROVINCE.	1896.		1895.		Average of the three years 1893 to 1895.		Percentage on weight of increase or decrease in 1896, compared with	
	Weight in tons.	Value.	Weight in tons.	Value.	Weight in tons.	Value.	1895.	Average of 1893 to 1895.
British Provinces.		₹		₹		₹		
Madras	2,296	1,920	2,828	1,930	2,168	1,547	−18·81	+48·41
Bombay including Sind	...	...	...	...	...	...	...	...
Bengal	6,120	11,965	32,207	97,091	28,965	89,543	−80·99	−78·87
North-West Provinces and Oudh.	...	...	...	...	...	...	...	...
Panjab	11	39	31	378	24	185	−64·51	−·54
Central Provinces	1,827	4,614	*6,159	*15,285	5,224	12,562	−70·33	−65·02
Assam	...	...	...	...	...	...	...	...
Burma	...	...	...	...	...	...	...	...
Total	10,254	18,538	41,225	1,14,684	36,381	1,03,837	−75·12	−71·81
Native States.								
Mysore	1,119	8,028	1,335	10,947	1,004	10,534	−16·17	+11·45
Kashmir	...	...	...	80	...	...	...	...
Baluchistan	...	...	...	...	...	...	...	...
Central India Agency	1,771	44,889	2,653	1,02,646	2,335	96,551	−33·24	−24·15
Rajputana States	632	15,470	855	47,572	798	39,529	−26·08	−20·80
Nizam's Dominions	Not given.	1,975	Not given.	2,103	...	2,786	...	...
Total	3,522	70,362	4,843	1,63,348	4,137	1,49,400	−27·27	−14·86
TOTAL BRITISH PROVINCES AND NATIVE STATES.	13,776	88,900	46,068	2,78,032	40,518	2,53,237	−70·09	−66·00

* Corrected figures supplied subsequent to the publication of last year's Review.

STATEMENT No. I.

Showing the Production of Minerals for which Statistics are available for the Calendar year 1896.

PETROLEUM.

PROVINCE.	1896.		1895.		Average of the three years 1893 to 1895.		Percentage on quantity of increase or decrease in 1896, compared with	
	Quantity in gallons.	Value.	Quantity in gallons.	Value.	Quantity in gallons.	Value.	1895.	Average of 1893 to 1895.
British Provinces.		₹		₹		₹		
Madras	...	...	...	...	...	...	...	...
Bombay including Sind	...	...	...	...	...	...	...	...
Bengal	...	...	...	...	...	...	...	...
North-West Provinces and Oudh.	...	...	...	...	...	...	...	...
Panjab	2,364	*337*	1,560	*353*	1,718	*398*	+51·53	+37·60
Central Provinces	...	...	...	...	...	...	...	...
Assam	(a) 238,730	(b) *23,873*	36,435	*7,287*	95,027	*17,721*	+555·22	+151·22
Burma	(c) 14,816,000	*17,69,145*	12,975,995	*15,34,951*	11,391,054	*11,25,610*	+14·18	+30·06
Total	15,057,094	*17,93,355*	13,013,990	*15,42,591*	11,487,799	*11,43,729*	+15·69	+31·07
Native States.								
Mysore	...	...	...	...	...	...	...	...
Kashmir	...	...	...	...	...	...	...	...
Baluchistan	...	...	...	...	(d) 17,650	(d) *3,210*	...	...
Central India Agency	...	...	...	...	...	...	...	...
Rajputana States	...	...	...	...	...	...	...	...
Nizam's Dominions	...	...	...	...	...	...	...	...
Total	...	...	...	...	17,650	*3,210*	...	...
TOTAL BRITISH PROVINCES AND NATIVE STATES.	15,057,094	***17,93,355***	13,013,990	***15,42,591***	11,505,449	***11,46,939***	+15·69	+30·86

(*a*) Increase in quantity and total value as compared with preceding year is reported to be due to the extension of the operations of the Assam Railways and Trading Company, which completed its refinery during the year.
(*b*) Value of the crude or unrefined oil at the well.
(*c*) Increase [in Pakôkku] owing to the steady increase of the oil industry and to extended operations.
(*d*) Average of the three years 1892 to 1894.

Weights and Values of the Salt, Coal, Iron and Petroleum carried by Rail and River in British India between 1st April 1895 and the 31st March 1896.

Weight of Salt carried by Rail and River in British

IMPORTED

SALT.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
QUANTITY.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras . . .	...	30	...	3,168	...	...	...	...	...	3,198
Bombay . . .	68,584	...	...	1,411	414,451	...	1,415,112	398,879	...	2,298,437
Sind	...	...	...	...	...	2,366	...	...	...	2,366
Bengal . . .	...	...	...	...	8,861	...	280	...	83,892	93,033
North-West Provinces and Oudh.	...	677	...	3,560	...	2,131	3,558	14	...	9,940
Panjab . . .	...	...	10,019	78,574	321,870	...	157	192	...	410,812
Central Provinces .	...	20	...	3,156	152	...	...	33	...	3,361
Berar . . .	...	...	...	...	...	...	215	...	...	215
Assam . . .	...	...	...	209	...	...	...	...	...	209
Total .	*68,584*	*727*	*10,019*	*90,078*	*745,334*	*4,497*	*1,419,322*	*399,118*	*83,892*	*2,821,571*
Native States.										
From—										
Rajputana and Central India.	9	2,583	...	...	2,868,011	282,961	128,138	...	...	3,281,702
Nizám's Dominions .	101	2,064	...	...	...	...	...	26	...	2,191
Mysore . . .	630	38	...	...	...	...	...	...	...	668
Total .	*740*	*4,685*	...	...	*2,868,011*	*282,961*	*128,138*	*26*	...	*3,284,561*
Chief Seaports.										
From—										
Madras Ports . .	2,140,012	20	...	...	...	...	...	...	...	2,140,032
Bombay . . .	69,621	20,180	...	15	15	66	1,466	9,135	...	100,498
Karachi . . .	...	...	205,934	...	...	212	...	...	...	206,146
Calcutta . . .	...	...	...	7,624,161	453,641	93	...	...	560,843	8,638,738
Total .	*2,209,633*	*20,200*	*205,934*	*7,624,176*	*453,656*	*371*	*1,466*	*9,135*	*560,843*	*11,085,414*
GRAND TOTAL IN MAUNDS	*2,278,957*	*25,612*	*215,953*	*7,714,254*	*4,067,001*	*287,829*	*1,548,926*	*408,279*	*644,735*	*17,191,546*
GRAND TOTAL IN TONS .	83,410	937	7,904	282,342	148,852	10,535	56,691	14,943	23,597	629,211

IN SALT.

India between 1st April 1895 and 31st March 1896.

INTO

NATIVE STATES.				CHIEF SEAPORTS.					GRAND TOTAL.		SALT.
Rajputana and Central India.	Nizám's Territory.	Mysore.	Total.	Madras Ports	Bombay.	Karachi.	Calcutta.	Total.			
Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Tons.	QUANTITY.
											British Provinces (EXCLUDING CHIEF SEAPORTS).
											From—
8	182,259	2,378	184,645	22,981	...	...	...	22,981	***210,824***	7,716	Madras.
376,204	542,002	94,756	1,012,962	...	647	...	...	647	***3,312,046***	121,221	Bombay.
...	...	...	...	...	...	...	...	...	***2,366***	87	Sind.
...	...	...	...	...	...	...	40,115	40,115	***133,148***	4,873	Bengal.
57,517	...	...	57,517	...	...	...	2,193	2,193	***69,650***	2,549	North-West Provinces and Oudh.
3,027	3	...	3,030	...	...	226	496	722	***414,564***	15,173	Panjab.
18,457	...	...	18,457	...	11	...	...	11	***21,829***	799	Central Provinces.
...	201	...	201	...	...	...	...	...	***416***	15	Berar.
...		...	...	...	...	...	...	...	***209***	8	Assam.
455,213	*724,465*	*97,134*	*1,276,812*	*22,981*	*658*	*226*	*42,804*	*66,669*	***4,165,052***	152,441	Total.
											Native States.
											From—
...	...	...	...	...	...	...	...	...	***3,281,702***	120,110	Rajputana and Central India.
...	...	...	...	...	...	...	...	...	***2,191***	80	Nizám's Dominions.
...	...	...	...	...	...	...	...	...	***668***	25	Mysore.
...	...	...	...	...	...	...	...	...	***3,284,561***	120,215	Total.
											Chief Seaports.
											From—
...	11,851	101,840	113,691	...	...	...	...	...	***2,253,723***	82,486	Madras Ports.
7	70,949	269,092	340,048	...	...	...	...	...	***440,546***	16,124	Bombay.
...	...	...	...	...	...	...	...	...	***206,146***	7,545	Karachi.
...	...	...	...	...	...	...	...	...	***8,638,738***	316,178	Calcutta.
7	*82,800*	*370,932*	*453,739*	...	...	...	...	...	***11,539,153***	422,333	Total.
455,220	*807,265*	*468,066*	*1,730,551*	*22,981*	*658*	*226*	*42,804*	*66,669*	***18,988,766***	...	GRAND TOTAL IN MAUNDS.
16,661	**29,546**	**17,131**	**63,338**	**841**	**24**	**8**	**1,567**	**2,440**	...	**694,989**	GRAND TOTAL IN TONS.

Value of Salt carried by Rail and River in British

IMPORTED

SALT.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
VALUE.	₹	₹	₹	₹	₹	₹	₹	₹	₹	₹
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras	[illegible]	98	...	10,296	...	...	...	...	...	10,394
Bombay	2,40,044	...	...	4,938	14,50,579	...	49,52,892	13,96,076	...	80,44,529
Sind	...	...	...	...	...	7,394	...	...	...	7,394
Bengal	...	...	...	...	27,691	...	875	...	2,62,163	2,90,729
North-West Provinces and Oudh.	...	2,454	...	12,905	...	7,725	12,898	51	...	36,033
Panjab	...	...	32,562	2,55,365	10,46,078	...	516	624	...	13,35,139
Central Provinces	...	80	...	12,624	608	...	...	132	...	13,444
Berar	...	...	...	...	...	...	779	...	...	779
Assam	...	...	...	653	...	...	...	...	...	653
Total	*2,40,044*	*2,632*	*32,562*	*2,96,781*	*25,24,956*	*15,119*	*49,67,954*	*13,96,883*	*2,62,163*	*97,39,094*
Native States.										
From—										
Rajputana and Central India.	29	9,040	...	...	1,03,96,540	9,19,623	5,12,552	...	...	1,18,37,784
Nizám's Territory	328	7,224	...	...	...	...	...	94	...	7,646
Mysore	2,048	133	...	...	...	...	...	...	...	2,181
Total	*2,405*	*16,397*	...	...	*1,03,96,540*	*9,19,623*	*5,12,552*	*94*	...	*1,18,47,611*
Chief Seaports.										
From—										
Madras Ports	69,55,039	65	...	...	...	...	...	...	...	69,55,104
Bombay	2,43,673	70,630	...	53	53	231	5,131	31,972	...	3,51,743
Karachi	...	...	6,43,544	...	...	662	...	...	...	6,44,206
Calcutta	...	...	...	2,38,25,503	14,17,628	291	...	...	17,52,634	2,69,96,056
Total	*71,98,712*	*70,695*	*6,43,544*	*2,38,25,556*	*14,17,681*	*1,184*	*5,131*	*31,972*	*17,52,634*	*3,49,47,109*
TOTAL VALUE	74,41,161	89,724	6,76,106	2,41,22,337	1,43,39,177	935,926	54,85,637	14,28,949	20,14,797	5,65,33,814

IN SALT.

India between 1st April 1895 and 31st March 1896.

INTO

NATIVE STATES.				CHIEF SEAPORTS.					GRAND TOTAL.	SALT.
Rajputana and Central India.	Nizám's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.		
R	R	R	R	R	R	R	R	R	R	VALUE.
										British Provinces (EXCLUDING CHIEF SEAPORTS).
										From—
26	5,92 342	7,728	6,00,096	74,688	...	...	...	74,688	***6,85,178***	Madras.
13,16,714	18,97,007	3,31,646	35,45,367	...	2,265	...	...	2,265	***1,15,92,161***	Bombay.
...	...	...	...	...	...	...	...	...	***7,394***	Sind.
...	...	...	...	...	...	...	1,25,359	1,25,359	***4,16,088***	Bengal.
2,08,499	...	...	2,08,499	...	...	...	7,950	7,950	***2,52,482***	North-West Provinces and Oudh.
9,838	10	...	9,848	...	...	734	1,612	2,346	***13,47,333***	Panjab.
73,828	...	...	73,828	...	44	...	...	44	***87,316***	Central Provinces.
...	729	...	729	...	...	...	...	...	***1,508***	Berar.
...	...	...	...	...	...	...	...	...	***653***	Assam.
16,08,905	*24,90,088*	*3,39,374*	*44,38,367*	*74,688*	*2,309*	*734*	*1,34,921*	*2,12,652*	***1,43,90,113***	Total.
										Native States.
										From—
...	...	...	...	...	...	...	...	...	***1,18,37,784***	Rajputana and Central India.
...	...	...	...	...	...	...	...	...	***7,646***	Nizám's Territory.
...	...	...	...	...	...	...	...	...	***2,181***	Mysore.
...	...	...	...	...	...	...	...	...	***1,18,47,611***	Total.
										Chief Seaports.
										From—
...	38,516	3,30,980	3,69,496	...	...	...	...	...	***73,24,600***	Madras Ports.
24	2,48,322	9,41,822	11,90,168	...	...	...	...	...	***15,41,911***	Bombay.
...	...	...	...	...	...	...	...	...	***6,44,206***	Karachi.
...	...	...	...	...	...	...	...	...	***2,69,96,056***	Calcutta.
24	*2,86,838*	*12,72,802*	*15,59,664*	...	...	...	...	...	***3,65,06,773***	Total.
16,08,929	27,76,926	16,12,176	59,98,031	74,688	2,309	734	1,34,921	2,12,652	***6,27,44,497***	TOTAL VALUE.

Weight of Coal and Coke carried by Rail and River in British

IMPORTED

COAL AND COKE.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
QUANTITY.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras . . .	...	7,564	...	...	...	...	...	...	...	7,564
Bombay . . .	18	...	...	...	1,334	299	3,429	9,625	...	14,705
Sind . . .	...	...	...	...	...	322	...	...	...	322
Bengal . . .	...	340	...	...	11,934,663	694,784	870,040	57,954	41,230	13,599,011
North-West Provinces and Oudh.	...	11,067	...	1,720	...	2,599,839	84,489	...	...	2,697,115
Panjab . . .	...	...	124	...	1,269	...	...	...	...	1,393
Central Provinces .	...	1,187,813	...	...	4,500	...	...	669,890	...	1,862,203
Berar . . .	...	6,430	...	...	...	...	15	...	...	6,445
Assam . . .	...	...	...	1,525,343	...	...	...	...	...	1,525,343
Total .	*18*	*1,213,214*	*124*	*1,527,063*	*11,941,766*	*3,295,244*	*957,973*	*737,469*	*41,230*	*19,714,101*
Native States.										
From—										
Rajputana and Central India.	...	366,585	...	...	1,320,232	9,098	1,039,129	14,655	...	2,749,699
Nizám's Territory .	3,812,010	1,622,660	...	...	...	...	81,894	...	...	5,516,564
Mysore . . .	6,100	14	...	...	...	...	...	...	...	6,114
Total .	*3,818,110*	*1,989,259*	...	...	*1,320,232*	*9,098*	*1,121,023*	*14,655*	...	*8,272,377*
Chief Seaports.										
From—										
Madras Ports . .	629,680	8	...	...	...	...	...	...	...	629,688
Bombay . . .	41	3,654,870	...	...	371	...	4,542	1,665	...	3,661,489
Karachi . . .	...	...	294,653	...	...	64,845	...	...	...	359,498
Calcutta . . .	...	...	...	942,180	2,742	...	41	...	66,123	1,011,086
Total .	*629,721*	*3,654,878*	*294,653*	*942,180*	*3,113*	*64,845*	*4,583*	*1,665*	*66,123*	*5,661,761*
GRAND TOTAL IN MAUNDS	*4,447,849*	*6,857,351*	*294,777*	*2,469,243*	*13,265,111*	*3,369,187*	*2,083,579*	*753,789*	*107,353*	*33,648,239*
GRAND TOTAL IN TONS .	162,791	250,979	10,789	90,374	485,503	123,312	76,259	27,589	3,929	1,231,525

IN COAL.

India between 1st April 1895 and 31st March 1896.

INTO

NATIVE STATES.				CHIEF SEAPORTS.					GRAND TOTAL.		COAL AND COKE.
Rajputana and Central India.	Nizám's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.			
Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Tons.	QUANTITY.
											British Provinces (EXCLUDING CHIEF SEAPORTS).
											From—
...	7	109,754	109,761	384,973	...	...	...	384,973	***502,298***	18,384	Madras.
381,053	212	2	381,267	...	402,488	...	...	402,488	***798,460***	29,220	Bombay.
...	...	...	...	...	...	1,898	...	1,898	***2,220***	81	Sind.
279,333	...	...	279,333	...	18	...	38,035,430	38,035,448	***51,913,792***	1,900,045	Bengal.
1,142,731	...	...	1,142,731	...	11	...	...	11	***3,839,857***	140,539	North-West Provinces and Oudh.
190	...	...	190	...	...	1	...	1	***1,584***	58	Panjab.
161,982	...	...	161,982	...	2,449	...	...	2,449	***2,026,634***	74,175	Central Provinces.
311	...	...	311	...	...	...	...	...	***6,756***	247	Berar.
...	...	...	...	...	...	...	396,564	396,564	***1,921,907***	70,242	Assam.
1,965,600	*219*	*109,756*	*2,075,575*	*384,973*	*404,966*	*1,899*	*38,431,994*	*39,223,832*	***61,013,508***	2,233,094	Total.
											Native States.
											From—
...	...	...	...	...	...	...	...	...	***2,749,699***	100,639	Rajputana and Central India.
...	...	..	...	31,628	68,862	...	...	100,490	***5,617,054***	205,584	Nizám's Territory.
...	...	...	...	8	...	...	...	8	***6,122***	224	Mysore.
...	...	...	...	*31,636*	*68,862*	...	...	*100,498*	***8,372,875***	306,447	Total.
											Chief Seaports.
											From—
...	141	2,548,409	2,548,550	...	...	...	...	...	***3,178,238***	116,323	Madras Ports.
138,539	2,062	...	140,601	812	...	...	...	812	***3,802,902***	139,186	Bombay.
...	...	...	...	...	...	...	...	...	***359,498***	13,158	Karachi.
...	...	...	...	...	...	...	...	...	***1,011,086***	37,006	Calcutta.
138,539	*2,203*	*2,548,409*	*2,689,151*	*812*	...	...	...	*812*	***8,351,724***	305,673	Total.
2,104,139	*2,422*	*2,658,165*	*4,764,726*	*417,421*	*473,828*	*1,899*	*38,431,994*	*39,325,142*	***77,738,107***	...	GRAND TOTAL IN MAUNDS.
77,011	89	97,289	174,389	15,278	17,342	69	1,406,611	1,439,300	...	2,845,211	GRAND TOTAL IN TONS.

Value of Coal and Coke carried by Rail and River in British

IMPORTED

COAL AND COKE.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
VALUE.	₹	₹	₹	₹	₹	₹	₹	₹	₹	₹
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras . . .	...	5,673	...	...	...	...	...	...	...	5,673
Bombay . . .	13	...	...	...	917	206	2,357	6,617	....	10,110
Sind	...	...	...	...	...	342	...	...	...	342
Bengal . . .	...	213	...	...	74,59,164	4,34,240	5,43,775	36,221	25,769	84,99,382
North-West Provinces and Oudh.	...	8,300	...	1,290	...	19,49,879	63,367	...	...	20,22,836
Panjab . . .	...	...	155	...	1,586	...	....	...	...	1,741
Central Provinces .	...	2,96,953	...	...	1,125	...	...	1,67,473	...	4,65,551
Berar . . .	...	3,215	...	...	...	...	7	...	...	3,222
Assam . . .	...	...	...	7,62,671	...	...	...	...	...	7,62,671
Total .	*13*	*3,14,354*	*155*	*7,63,961*	*74,62,792*	*23,84,667*	*6,09,506*	*2,10,311*	*25,769*	*1,17,71,528*
Native States.										
From—										
Rajputana and Central India.	...	2,52,027	...	...	9,90,174	11,372	2,59,782	7,327	...	15,20,682
Nizám's Territory .	28,59,007	11,15,579	...	...	...	...	20,474	...	...	39,95,060
Mysore . . .	4,575	10	...	...	...	...	...	...	...	4,585
Total .	*28,63,582*	*13,67,616*	...	...	*9,90,174*	*11,372*	*2,80,256*	*7,327*	...	*55,20,327*
Chief Seaports.										
From—										
Madras Ports . .	4,72,260	6	...	...	...	...	...	...	...	4,72,266
Bombay . . .	28	25,12,723	...	...	255	...	3,123	1,145	...	25,17,274
Karachi . . .	...	...	3,13,069	...	...	68,898	...	...	...	3,81,967
Calcutta . . .	...	...	...	5,88,862	1,714	...	26	...	41,327	6,31,929
Total .	*4,72,288*	*25,12,729*	*3,13,069*	*5,88,862*	*1,969*	*68,898*	*3,149*	*1,145*	*41,327*	*40,03,436*
TOTAL VALUE . .	33,35,883	41,94,699	3,13,224	13,52,823	84,54,935	24,64,937	8,92,911	2,18,783	67,096	2,12,95,291

IN COAL.

India between 1st April 1895 and 31st March 1896.

INTO

NATIVE STATES.				CHIEF SEAPORTS.					GRAND TOTAL.	COAL AND COKE.
Rajputana and Central India.	Nizám's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.		
R	*R*	*R*	*R*	*R*	*R*	*R*	*R*	*R*	*R*	VALUE.
										British Provinces (EXCLUDING CHIEF SEAPORTS).
										From—
...	5	82,316	82,321	2,88,730	...	...	...	2,88,730	***3,76,724***	Madras.
2,61,974	146	1	2,62,121	...	2,76,711	...	...	2,76,711	***5,48,942***	Bombay.
...	...	...	...	...	...	2,017	...	2,017	***2,359***	Sind.
1,74,583	...	...	1,74,583	...	11	...	2,37,72,144	2,37,72,155	***3,24,46,120***	Bengal.
8,57,048	...	...	8,57,048	...	8	...	...	8	***28,79,892***	North-West Provinces and Oudh.
238	...	...	238	...	...	1	...	1	***1,980***	Panjab.
40,496	...	...	40,496	...	62	...	...	612	***5,06,659***	Central Provinces.
156	...	...	156	...	...	...	...	...	***3,378***	Berar.
...	...	...	...	...	...	...	1,98 282	1,98,282	***9,60,953***	Assam.
13,34495	*151*	*82,317*	*14,16,963*	*2,88,730*	*2,77,342*	*2,018*	*2,39,70,426*	*2,45,38,516*	***3,77,27,007***	Total.
										Native States.
										From—
...	...	...	...	...	...	...	...	...	***15,20,682***	Rajputana and Central India.
...	...	...	...	23,721	47,342	...	...	71,063	***40,66,123***	Nizám's Territory.
...	...	...	...	6	...	...	...	6	***4,691***	Mysore.
...	...	...	...	*23,727*	47,342	...	...	*71,069*	***55,91,396***	Total.
										Chief Seaports.
										From—
...	106	19,11,307	19,11,413	...	...	...	...	...	***23,83,679***	Madras Ports.
95,246	1,417	...	96,663	558	...	...	...	558	***26,14,495***	Bombay.
...	...	...	...	...	...	...	...	...	***3,81,967***	Karachi.
...	...	...	...	...	...	...	...	...	***6,31,929***	Calcutta.
95,246	*1,523*	*19,11,307*	*20,08,076*	558	...	...	...	558	***60,12,070***	Total.
14,29,741	1,674	19,93,624	34,25,039	3,13,015	3,24,684	2,018	2,39,70,426	2,46,10,143	***4,93,30,473***	TOTAL VALUE.

Weight of Iron carried by Rail and River in British

IMP ORTED

IRON.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
QUANTITY.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
British Provinces (Excluding Chief Seaports).										
From—										
Madras . . .	...	1,126	...	26	2	...	6	...	...	1,160
Bombay . . .	6,149	...	348	540	1,938	2,944	6,856	10,026	...	28,801
Sind	...	...	...	...	34	14,033	...	...	...	14,067
Bergal . . .	...	...	...	...	47,070	20,908	11,692	...	3,955	83,625
North-West Provinces and Oudh.	76	220	841	6,635	...	68,474	3,883	3	...	80,132
Central Provinces .	2	6,096	4	3,932	12,115	7,412	...	2,319	...	31,880
Panjab . . .	2	907	5,558	1,694	68,766	...	646	20	...	77,593
Berar . . .	1	5,011	...	...	152	30	1,146	...	...	6,340
Assam . . .	...	...	...	778	...	...	...	...	...	778
Total .	*6,230*	*13,360*	*6,751*	*13,605*	*1,30,077*	*113,801*	*24,229*	*12,368*	*3,955*	*324,376*
Native States.										
From—										
Rajputana and Central India.	1	5,794	28	4	17,110	12,586	5,125	121	...	40,769
Nizám's Territory .	1,055	1,578	...	...	1	8	...	179	...	2,821
Mysore . . .	9,282	867	...	...	...	...	1	...	...	10,150
Total .	*10,338*	*8,239*	*28*	*4*	*17,111*	*12,594*	*5,126*	*300*	...	*53,740*
Chief Seaports.										
From—										
Madras Ports . .	472,948	1,025	...	8	63	77	180	35	...	474,336
Bombay . . .	16,855	976,494	73	352	159,928	146,150	124,460	101,573	...	1,525,885
Karachi . . .	...	...	139,630	2	60,067	577,103	...	...	...	776,802
Calcutta . . .	33	151	241	1,051,606	474,279	72,749	17,993	72	281,572	1,898,696
Total .	*489,836*	*977,670*	*139,944*	*1,051,968*	*694,337*	*796,079*	*142,633*	*101,680*	*281,572*	*4,675,719*
Total in Maunds .	*506,404*	*999,269*	*146,723*	*1,065,577*	*841,525*	*922,474*	*171,988*	*114,348*	*2,85,527*	*5,053,835*
Total in Tons .	18,534	3,68,573	5,370	39,000	30,800	33,763	6,295	4,185	10,450	184,970

IN IRON.

India between 1st April 1895 and 31st March 1896.

INTO											
NATIVE STATES				CHIEF SEAPORTS.					GRAND TOTAL.		IRON.
Rajputana and Central India.	Nizám's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.			
Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Tons.	QUANTITY.
											British Provinces (EXCLUDING CHIEF SEAPORTS).
											From—
5	6,670	4,232	10,907	43,770	530	...	...	44,300	***56,367***	2,063	Madras.
3,254	5,450	157,615	166,319	59	18,811	2	12	18,884	***214,004***	7,832	Bombay.
3	...	13	16	...	...	4,519	...	4,519	***18,602***	681	Sind.
2,948	7	3	2,958	...	44	...	116,350	116,394	***202,977***	7,429	Bengal.
24,059	92	7	24,158	349	498	55	6,438	7,340	***111,630***	4,086	North-West Provinces and Oudh.
3,511	42	...	3,553	4	2,507	...	18,306	20,817	***56,250***	2,059	Central Provinces.
9,511	235	1	9,747	2	322	1,443	582	2,349	***89,689***	3,282	Panjab.
899	6	...	905	8	1,851	...	104	1,963	***9,208***	337	Berar.
...	...	...	...	...	...	...	2,576	2,576	***3,354***	123	Assam.
44,190	*12,502*	*161,871*	*218,563*	*44,192*	*24,563*	*6,019*	*144,368*	*219,142*	***762,081***	27,892	Total.
											Native States.
											From—
...	...	...	...	50	1,845	1	105	2,001	***42,770***	1,565	Rajputana and Central India.
...	...	...	...	526	955	...	...	1,481	***4,302***	158	Nizám's Territory.
...	...	...	...	7,699	52	...	2	7,753	***17,903***	655	Mysore.
...	*...*	*...*	*...*	*8,275*	*2,852*	*1*	*107*	*11,235*	***64,975***	**2,878**	Total.
											Chief Seaports.
											From—
28	3,257	230,446	233,731	...	129	...	...	129	***708,196***	25,920	Madras Ports.
210,156	133,307	18,949	362,412	6,625	...	...	120	6,745	***1,895,042***	69,359	Bombay.
125	...	...	125	...	...	...	...	...	***776,927***	28,435	Karachi.
15,278	64	40	15,382	7	462	8	...	477	***1,914,555***	70,073	Calcutta.
225,587	*136,628*	*249,435*	*611,650*	*6,632*	*591*	*8*	*120*	*7,351*	***5,294,720***	193,787	Total.
269,777	*149,130*	*411,306*	*830,213*	*59,099*	*28,006*	*6,028*	*144,595*	*237,728*	***6,121,776***	...	TOTAL IN MAUNDS.
9,874	**5,458**	**15,054**	**30,386**	**2,163**	**1,025**	**221**	**5,292**	**8,071**	...	**224,057**	TOTAL IN TONS.

Value of Iron carried by Rail and River in British

IMPORTED

IRON.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
VALUE.	₹	₹	₹	₹	₹	₹	₹	₹	₹	₹
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras . . .	...	4,926	...	114	9	...	26	...	...	5,075
Bombay . . .	31,129	...	1,762	2,734	9,811	14,904	34,708	50,757	...	1,45,805
Sind	...	...	...	...	136	56,132	...	...	...	56,268
Bengal . . .	...	...	...	...	2,53,001	1,12,380	62,845	...	21,258	4,49,484
North-West Provinces and Oudh.	446	1,292	4,941	38,981	...	4,02,285	22,813	18	...	4,70,776
Panjab . . .	9	4,081	25,011	7,623	3,09,447	...	2,907	90	...	3,49,168
Central Provinces .	13	39,624	26	25,558	78,748	48,178	...	15,074	...	2,07,221
Berar . . .	7	36,956	...	...	1,121	221	8,452	...	...	46,757
Assam . . .	...	...	...	4,181	...	...	...	...	...	4,181
Total .	*31,604*	*86,879*	*31,740*	*79,191*	*6,52,273*	*6,34,100*	*1,31,751*	*65,939*	*21,258*	*17,34,735*
Native States.										
From—										
Rajputana and Central India.	4	29,332	112	22	1,00,521	56,637	33,313	892	...	2,20,833
Nizám's Territory .	4,616	7,989	...	...	6	36	...	1,320	...	13,967
Mysore . . .	40,609	4,389	...	...	...	...	7	...	...	45,005
Total .	*45,229*	*41,710*	*112*	*22*	*1,00,527*	*56,673*	*33,320*	*2,212*	...	*2,79,805*
Chief Seaports.										
From—										
Madras Ports . .	20,69,148	4,484	...	35	276	337	787	153	...	20,75,220
Bombay . . .	85,328	49,43,501	370	1,782	8,09,636	7,39,884	6,30,079	5,14,213	...	77,24,793
Karachi . . .	...	...	5,88,520	8	2,40,268	23,08,412	...	...	...	31,07,208
Calcutta . . .	177	812	1,295	56,52,382	25,49,250	3,91,026	96,712	387	15,13,449	1,02,05,490
Total .	*21,54,653*	*49,48,797*	*5,60,185*	*56,54,207*	*35,99,430*	*34,39,659*	*7,27,578*	*5,14,753*	*15,13,449*	*2,31,12,711*
TOTAL VALUE .	22,31,486	50,77,386	5,92,037	57,33,420	43,52,230	41,30,432	8,92,649	5,82,904	15,34,707	2,51,27,251

IN IRON.

India between 1st April 1895 and 31st March 1896.

INTO										
NATIVE STATES.				CHIEF SEAPORTS.					GRAND TOTAL	IRON.
Rajputana and Central India.	Nizám's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.		
R	*R*	*R*	*R*	*R*	*R*	*R*	*R*	*R*	*R*	VALUE.
										British Provinces (EXCLUDING CHIEF SEAPORTS).
										From—
22	29,181	18,515	47,718	1,91,494	2,319	...	...	1,93,813	***2,46,606***	Madras.
16,473	27,591	7,97,926	8,41,990	299	95,231	10	61	95,601	***10,83,396***	Bombay.
12	...	52	64	...	...	18,076	...	18,076	***74,408***	Sind.
15,846	38	16	15,900	...	237	...	6,25,381	6,25,618	***10,91,002***	Bengal.
1,41,347	540	41	1,41,928	2,050	2,926	323	37,823	43,122	***6,55,826***	North-West Provinces and Oudh.
42,799	1,058	4	43,861	9	1,449	6,494	2,619	10,571	***4,03,600***	Panjab.
22,822	273	...	23,095	26	16,296	...	1,18,989	1,35,311	***3,65,627***	Central Provinces.
6,630	44	...	6,674	59	13,651	...	767	14,477	***67,908***	Berar.
...	...	...	...	...	...	...	13,846	13,846	***18,027***	Assam.
2,45,951	*58,725*	*8,16,554*	*11,21,230*	*1,93,937*	*1,32,109*	*24,903*	*7,99,486*	*11,50,435*	***40,06,400***	Total.
										Native States.
										From—
...	...	...	...	219	9,340	4	564	10,127	***2,30,960***	Rajputana and Central India.
...	...	...	...	2,301	4,835	...	...	7,136	***21,103***	Nizám's Territory.
...	...	...	...	33,683	263	...	11	33,957	***78,962***	Mysore.
...	...	...	...	*36,203*	*14,438*	*4*	*575*	*51,220*	***3,31,025***	Total.
										Chief Seaports.
										From—
123	14,249	10,08,201	10,22,573	...	564	...	...	564	***30,98,357***	Madras Ports.
10,63,915	6,74,867	95,929	18,34,711	33,539	...	...	607	34,146	***95,93,650***	Bombay.
500	...	...	500	...	...	...	...	...	***31,07,708***	Karachi.
82,119	344	215	82,678	38	2,483	43	...	2,564	***1,02,90,732***	Calcutta.
11,46,657	*6,89,460*	*11,04,345*	*29,40,462*	*33,577*	*3,047*	*43*	*607*	*37,274*	***2,60,90,447***	Total.
13,92,608	7,48,185	19,20,899	40,61,692	2,63,717	1,49 594	24,950	8,00,668	12,38,929	***3,04,27,872***	TOTAL VALUE.

Weight of Petroleum (Kerosine) carried by Rail

IMPORTED

PETROLEUM.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam	Total.
QUANTITY.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras . . .	...	362	...	...	...	...	...	...	...	362
Bombay . . .	5,545	...	...	...	...	...	11,498	31,257	...	48,300
Sind	...	...	...	...	...	2,919	...	...	...	2,919
Bengal . . .	45	...	...	...	471,446	129,397	151,101	3,466	100,390	855,845
North-West Provinces and Oudh.	...	...	...	7	...	4,171	2,007	...	...	6,185
Panjab . . .	...	...	4	24	1,437	...	...	...	...	1,465
Central Provinces .	...	...	...	50	25	1	...	98	...	174
Berar . . .	...	...	...	...	...	...	27	...	...	27
Assam . . .	...	...	...	134	...	...	...	...	...	134
Total .	*5,590*	*362*	*4*	*215*	*472,908*	*136,488*	*164,633*	*34,821*	*100,390*	*915,411*
Native States.										
From—										
Rajputana and Central India.	...	21	...	...	130	7	26	...	...	184
Nizám's Territory .	37	...	...	...	...	...	...	...	...	37
Mysore . . .	1,090	61	...	...	...	...	...	...	...	1,151
Total .	*1,127*	*82*	...	...	*130*	*7*	*26*	...	...	*1,372*
Chief Seaports.										
From—										
Madras Ports . .	186,339	...	...	...	...	...	...	...	...	186,339
Bombay . . .	837	259,274	...	...	8,609	4,379	71,826	95,099	...	440,024
Karachi . . .	...	...	16,978	...	964	100,038	...	...	...	117,980
Calcutta . . .	...	...	...	958,853	7,799	1,069	595	...	148,185	1,116,501
Total .	*187,176*	*259,274*	*16,978*	*958,853*	*17,372*	*105,486*	*72,421*	*95,099*	*148,185*	*1,860,844*
TOTAL IN MAUNDS .	*193,893*	*259,718*	*16,982*	*959,068*	*490,410*	*241,981*	*237,080*	*129,920*	*248,575*	*2,777,627*
TOTAL IN GALLONS .	1,551,144	2,077,744	135,856	7,672,544	3,923,280	1,935,848	1,896,640	1,039,360	1,988,600	22,221,016

PETROLEUM.

and River in British India between 1st April 1895 and 31st March 1896.

INTO

NATIVE STATES.				CHIEF SEAPORTS.					GRAND TOTAL.		PETROLEUM.
Rajputana and Central India.	Nizám's Territory	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.			
Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Gallons.	QUANTITY.
											British Provinces (EXCLUDING CHIEF SEAPORTS)
											From—
...	8,731	46	8,777	2,467	...	...	...	2,467	***11,606***	92,848	Madras.
2,020	3,105	27,259	32,384	11	114	...	...	125	***80,809***	646,472	Bombay.
...	...	...	...	...	...	151	...	151	***3,070***	24,560	Sind.
12,336	...	...	12,336	...	4	...	905	909	***869,090***	6,952,720	Bengal.
7,659	...	...	7,659	...	...	224	8	232	***14,076***	112,608	North-West Provinces and Oudh.
1,249	...	...	1,249	...	...	11	...	11	***2,725***	21,800	Panjab.
1,186	...	...	1,186	...	...	...	...	...	***1,360***	10,880	Central Provinces.
...	...	...	...	...	...	...	...	...	***27***	216	Berar.
...	...	...	...	...	...	...	...	...	***134***	1,072	Assam.
24,450	*11,836*	*27,305*	*63,591*	*2,478*	*118*	*386*	*913*	*3,895*	***982,897***	7,863,176	Total.
											Native States.
											From—
...	...	...	...	...	...	...	...	...	***184***	1,472	Rajputana and Central India.
...	...	...	...	...	...	...	...	...	***37***	296	Nizám's Territory.
...	...	...	...	2	...	...	...	2	***1,153***	9,224	Mysore.
...	...	...	...	2	...	...	...	2	***1,374***	10,992	Total.
											Chief Seaports.
											From—
...	25,128	74,297	99,425	...	...	...	...	...	***285,764***	2,286,112	Madras Ports.
124,224	18,449	1,190	143,863	47	...	...	...	47	***583,934***	4,671,472	Bombay.
...	...	...	...	...	...	...	...	...	***17,980***	943,840	Karachi.
250	...	...	250	...	...	...	...	...	***1,116,751***	8,934,008	Calcutta.
124,474	*43,577*	*75,487*	*243,538*	*47*	...	...	...	*47*	***2,104,429***	16,835,432	Total.
148,924	*55,413*	*102,792*	*307,129*	*2,527*	*118*	*386*	*913*	*3,944*	***3,088,700***	...	TOTAL IN MAUNDS.
1,191,392	443,304	822,336	2,457,032	20,216	944	3,088	7,304	31,552	...	24,709,600	TOTAL IN GALLONS.

PETROLEUM.
VALUES.

TRAFFIC IN

Value of Petroleum (Kerosine) carried by Rail and

IMPORTED

PETROLEUM.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Punjab.	Central Provinces.	Berar.	Assam.	Total.
VALUE.	₹	₹	₹	₹	₹	₹	₹	₹	₹	₹
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras	...	1,923	...	...	...	...	...	...	...	1,923
Bombay	29,804	...	...	...	...	...	61,802	1,68,007	...	2,59,613
Sind	...	...	...	...	...	12,041	...	...	...	12,041
Bengal	180	...	...	...	18,85,784	5,17,588	6,04,404	13,864	4,01,560	34,23,380
North-West Provinces and Oudh.	...	...	...	42	...	25,026	12,042	...	...	37,110
Panjab	...	...	22	135	8,083	...	...	...	...	8,240
Central Provinces	...	...	...	313	156	6	...	613	...	1,088
Berar	...	...	...	...	...	...	140	...	...	140
Assam	...	...	...	586	...	...	...	...	...	586
Total	*29,984*	*1,923*	*22*	*1,076*	*18,94,023*	*5,54,661*	*6,78,388*	*1,82,484*	*4,01,560*	*37,44,121*
Native States.										
From—										
Rajputana and Central India.	...	113	...	...	780	39	163	...	...	1,095
Nizám's Territory	196	...	...	...	...	...	...	...	...	196
Mysore	5,791	328	...	...	...	...	...	...	...	6,119
Total	*5,987*	*441*	...	...	*780*	*39*	*163*	...	...	*7,410*
Chief Seaports.										
From—										
Madras Ports	9,89,926	...	...	...	...	...	...	...	...	9,89,926
Bombay	4,499	13,93,598	...	...	46,273	23,537	3,86,065	5,11,157	...	23,65,129
Karachi	...	...	70,031	...	3,976	4,12,657	...	...	...	4,86,667
Calcutta	...	...	...	38,35,412	31,196	4,276	2,380	...	5,92,740	44,66,004
Total	*9,94,425*	*13,93,598*	*70,034*	*38,35,412*	*81,445*	*4,40,470*	*3,88,445*	*5,11,157*	*5,92,740*	*83,07,726*
TOTAL VALUE	10,30,396	13,95,962	70,056	38,36,488	19,76,248	9,95,170	10,66,996	16,93,641	9,94,300	1,20,59,257

PETROLEUM.

River in British India between 1st April 1895 and 31st Mar

INTO

NATIVE STATES.				CHIEF SEAPORTS.					GRAND TOTAL.	PETROLEUM.
Rajputana and Central India.	Nizám's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi	Calcutta.	Total.		
R	R	R	R	R	R	R	R	R	R	VALUE.
										British Provinces (EXCLUDING CHIEF SEAPORTS).
										From—
...	46,384	244	46,628	13,106	...	...	...	13,106	**61,657**	Madras.
10,858	16,689	1,46,517	1,74,064	59	613	...	...	672	**4,34,349**	Bombay.
...	...	...	...	...	...	623	...	623	**12,664**	Sind.
49,344	...	...	49,344	...	16	...	3,620	3,636	**34,76,360**	Bengal.
45,954	...	...	45,954	...	...	1,344	48	1,392	**84,456**	North-West Provinces and Oudh.
7,026	...	...	7,026	...	...	62	...	62	**15,328**	Panjab.
7,413	...	...	7,413	...	...	...	...	...	**8,501**	Central Provinces.
...	...	...	...	...	...	...	...	...	**140**	Berar.
...	...	...	...	...	...	...	...	...	**586**	Assam.
1,20,595	63,073	1,46,761	3,30,429	13,165	629	2,029	3,668	19,491	**40,94,041**	Total.
										Native States.
										From—
...	...	...	...	...	...	...	...	...	**1,095**	Rajputana and Central India.
...	...	...	...	...	...	...	...	...	**196**	Nizam's Territory.
...	...	...	...	11	...	...	...	11	**6,130**	Mysore.
...	...	...	...	11	...	...	...	11	**7,421**	Total.
										Chief Seaports.
										From—
...	1,33,492	3,94,703	5,28,195	...	...	...	...	...	**15,18,121**	Madras Ports.
6,67,704	99,164	6,396	7,73,264	253	...	...	...	253	**31,38,646**	Bombay.
...	...	...	...	...	...	...	...	...	**4,86,667**	Karachi.
1,000	...	...	1,000	...	...	...	...	...	**44,67,004**	Calcutta.
6,68,704	2,32,656	4,01,099	13,02,459	253	...	...	...	253	**96,10,438**	Total.
7,89,299	2,95,729	5,47,860	16,32,888	13,429	629	2,029	3,668	19,755	**1,37,11,900**	TOTAL VALUE.

GOVERNMENT OF INDIA.

DEPARTMENT OF REVENUE AND AGRICULTURE.

REVIEW

MINERAL PRODUCTION IN INDIA

1897.

DAVID HOOPER, F.I.C., F.C.S.,

OFFG. REPORTER ON ECONOMIC PRODUCTS TO THE GOVERNMENT OF INDIA.

Published by order of the Governor General in Co

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APPENDIX—

Statement No. I. Showing the Production of the Minerals (Salt, Coal, Iron, and Petroleum) for which Statistics are available for the Calendar year 1897 71
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Statement I.

(*For the Review of Statement II, see page 33.*)

THE MORE IMPORTANT MINERALS.

I.—SALT (*Namak*, HIND.).

SALT:

I.—PRODUCTION OF SALT IN INDIA.

PRODUCTION.

The production of salt in the whole of India last year came to 923,118 tons, against 1,026,927 tons in 1896, and from the information tabulated on page 72 will be found to manifest a decrease of 10·10 per cent. on the outturn of the previous year. A comparison of the present returns, with the average of the past three years, shows still further the production to manifest a decline of 20·60 per cent. On the other hand, the consumption has largely increased with the growth of the population. The obvious explanation of these facts is that the manufacture of salt from the lakes and estuarise of India is dependent to a large extent on the favourableness or otherwise of the season. In good years a far larger amount is made than is actually required, and the surplus is stored against a season when it might not be possible to manufacture sufficient to meet actual consumption.

II.—SOURCES OF SUPPLY, METHODS OF MANUFACTURE, AND PRICE OF PRODUCTION.

1. There are four chief sources of salt supply: (*a*) Evaporation salt from the lakes and pits of Rajputana; (*b*) Evaporation salt obtained directly or indirectly from the sea; (*c*) Rock salt of the Panjab; and (*d*) Foreign salt imported into India. The table, para. 34, gives the total production for the past five years.

The administration of the Salt Revenue may be said to be vested in five offices as follows:—(1) the Commissioner of Salt Revenue, Northern India; (2) the Board of Revenue, Bengal; (3) the Collector of Salt Revenue, Bombay; (4) the Collector of Salt Revenue, Sind; and (5) the Board of Revenue (Separate Revenue), Madras. It may serve a useful purpose to give very briefly an account of the sources of supply in relation to the administrative organisation.

2. ***NORTHERN INDIA.***—The EVAPORATION salt of Rajputana is derived from the Sambhar lake, the Didwana lake, and the Pachbadra pits. NORTHERN INDIA:

The ***SAMBHAR*** lake is by far the most important. It is situated on the borders of the Jaipur and Jodhpur States. It is a shallow sheet of water which measures 20 miles in length and averages from 2 to 7 miles in breadth, but contains when full only some one to four feet of water. The salt obtained is of very high quality and is consumed throughout the North-West Provinces and Oudh, Rajputana and Central India. The working season ordinarily is from November to May, but it varies greatly according to the character and extent of the previous rains. It is this circumstance mainly that accounts for the extreme fluctuations shown in the returns of production. The lake is leased by Government from the Jaipur and Jodhpur States for ₹7,00,000 with, in addition, a royalty of 40 per cent. of the price of salt sold in excess of 63,135 tons. The royalty may be said to add, on an average, the further payment of ₹2,00,000 a year. Sambhar.

Three descriptions of salt are made at Sambhar, *viz.*, (*a*) *Kyar* salt produced in permanently walled compartments within the lake; (*b*) pan salt made in shallow basins constructed along the shores of the lake; and (*c*) lake salt, that is, salt that forms spontaneously in the bed of the lake as the water evaporates, and without any assistance, except light screens run out to retain the brine within selected areas, in other words to prevent its receding into the distant central basin.

(*a*) The object of the formation of permanent walls (*kyars*) is to allow of manufacture at times when extraction by other processes would be impossible, owing to there being either too much or too little brine. There are ten *kyars* in operation, sub-divided into pans about two feet in depth by a pathway running between. The supply of brine is regulated as desired. Soft earth is carefully removed from the pans, in order that the deposit of salt may be as clean as possible. The salt produced is accordingly of excellent quality and is formed into large crystals. In good years the produce of *kyar* salt amounts to over 36,600 tons.

(*b*) The pan-salt, produced on the shore of the lake, is superior to that formed naturally, but inferior to *kyar* salt. It is small in grain and the crystals are badly formed. The pans are constructed of the clay of the soil and they last for only one season. They are scattered along the shore for a distance of 20 miles, and as the water of the lake recedes fresh pans have to be made further and further in. They are fed by trenches from the deeper water. The brine is raised from the trenches or reservoirs by hand pumps or by baskets lined with leather. These are swung by two men, who stand on either side of the trench and hold the ropes attached to the baskets. The brine is scooped out, as it were, and thrown to the higher level. In a fair average season the quantity of salt, made in this way, comes to about 91,500 tons.

SALT: PRODUCTION.

NORTHERN INDIA. Sambhar.

(c) The naturally formed salt amounts to about 36,600 tons. The highest record of total production at Sambhar was in 1883-84, when 260,276 tons were turned out, and the lowest 1892-93, *viz.*, 3,318 tons. The former was an abnormally favourable and the latter an abnormally unfavourable year. The average during the past four years has been 180,304 tons. In 1892-93, the rainfall came to 41 inches, or about 15 inches over the highest record. The prevailing wind was also easterly and damp. Crop after crop of salt as it formed was again destroyed by the showers that fell throughout the year. The liability, therefore, to fluctuations such as indicated necessitates large storage. In favourable years no opportunity is lost to advance production. When the year 1883-84 opened, there was a balance of salt in store at Sambhar of 166,358 tons. The manufactures of that year came to 260,276 tons and the sales were 134,738 tons. When 1892-93 closed, the year of lowest recorded production, the sales had been 187,011 tons, but the surplus stock even then came to 10,326 tons. These figures illustrate the balance usually preserved by storage on fluctuations of production. The table, para. 34, gives the total production during the past five years, and it will be seen the amount produced in 1897 compares unfavourably with the three previous years.

The actual cost of production and storage is usually about 6 pies per maund, but on adding the cost of establishment and supervision, rent of the source, royalty on sales and all other petty charges, it comes to 3 annas and 8·46 pies a maund. The average price obtained for the salt sold at the source may be put at 4 annas and 0·11 pies per maund. Owing to the high price of food, labour was last year abundant and cost of production low, *viz.*, 3·91 pies a maund.

Didwana.

3. The ***DIDWANA SALT*** is derived from a small lake about three miles long and one mile broad. It belongs to the Jodhpur State, but is leased by the Government of India for ₹2,00,000. The working season extends from February to the commencement of the rains. The average production at Didwana during the past four years has been 14,035 tons. The average cost of actual production and storage comes to 5·34 pies per maund, but if to this be added supervision, rent and all other charges, the net cost of production comes to 2 annas 9·32 pies per maund.

Pachbadra.

4. The ***PACHBADRA.***—This source of supply has been leased by Government from the Jodhpur State for ₹1,70,000 a year. The salt is procured from pits dug within what might be described as a former river bed. The area over which the works extend is about six by two and a half miles. The salt is known by the names of the three working sections, *viz.*, Sambra, Hiragarh and Pusali. Sambra salt is of the best quality and forms into larger crystals than the salt of the other two sections. The pits are sunk in clay soil, those in Hiragarh and Pusali being in more sandy soils. There is practically no working season at Pachbadra; salt may be obtained any time, except during heavy rains or sand-storms. The average annual production during the past four years has been 30,266 tons. The cost of production comes usually to 3 annas 3·91 pies a maund, but it fluctuates greatly in relation to the conditions of Sambhar production.

Seven hundred and fifty-two tons of salt were mined at Lunkaransar, 50 miles north of Bikanir, in 1897, and valued at ₹45,322. In 1896, 815 tons were made at a cost of ₹49,124. 9,024 labourers are employed in mining at the rate of 0-2-6 per head. The salt is only used by the poorer classes and given to cattle and other animals. It is also employed for curing hides.

Rock Salt.

5. The ***ROCK SALT*** of Northern India is excavated from, first, the salt mines of the Salt Range which extend for 152 miles fromthe Jhelam to the Indus; second, the salt mines of Kohat (trans-Indus); and third, the Himalayan salt mines of the Mandi State. The first may be spoken of as the salt mines of the Panjab. They consist of the Mayo mines in the Jhelam district; the Warcha mines in the Shahpur district; and the Kalabagh mines of the Bannu district.

Mayo Mines.

The ***Mayo Mines*** are said to have five workable salt seams, with an aggregate thickness of fully 275 feet and between these marl and unworkable salt to the extent of *other* 275 feet. The mines open into the Khewra gorge and are entered by a tunnel along which a tramway is laid. Operations are carried from the roof downwards passing through the strata. The salt is obtained by pick and blast in the usual way with all mining operations. The chambers thus excavated are separated by walls of salt 25 to 30 feet in thickness. Some of these chambers measure 250 feet long by 45 feet wide and 200 feet in height. It has been stated, in a criticism on the wisdom of treating salt, "technically a mineral," as such, that "a salt merchant may be called a dealer in minerals, but a gold miner would repudiate the idea, and a diamond merchant would utterly scout it." The salt mining operations of the Panjab compare not unfavourably even from an engineering point of view, with either the gold or the coal mining of other provinces. They give employment to about 700 miners. The supply is inexhaustible and is liable to little or no interruptions. The output is entirely dependent on demand. Since the opening of the Sind-Sagar State Railway and the bridging of the Jhelam at Chok Nizam the trade with the North-West Provinces has been greatly expanded, and yearly increasing supplies are being sent even to Patna and Gya in Behar, thus to a certain extent penetrating into the area formerly exclusively held by European salt. The salt obtained from these mines is of a very pure quality, as much as 97 to 98 per cent. being sodium chloride. The average production during the past four years has been 66,407 tons, but the output first exceeded that average in 1889-90 and has never materially fallen below it. The table, para. 34, gives the actual production of rock salt during the past five years. Mayo mines salt landed at the depôt may be said to be produced at 8 pies per maund, or, say, ₹1-3 per ton. The cost of excavation in these mines is 10½ pies a cubic foot or ₹4-0-9·78 per 100 maunds.

Warcha Mines.

6. The ***Warcha Mines*** are similar, though on a smaller scale, to the Mayo, and the ***Kalabagh, Kohat,*** and ***Mandi*** would more correctly be described as quarries than mines. The quantity of salt at Kohat is absolutely inexhaustible. At Bahadur Kheyl, for example, the all but naked salt is four miles long and

averages a quarter of a mile wide with some of the visible salt strata over 1,000 feet in thickness. It has been estimated that the Kohat salt comes to over 150 millions of tons.

Brine-wells. Sultanpur.

7. *SULTANPUR.*—Lastly, in the Panjab, over a tract of country of some 15 square miles in extent, that lies south-west of Delhi, salt is obtained from brine wells. This is known as Sultanpur salt from the name of the chief village. It is, however, of very inferior quality, though of good colour, is small grained and bitter to taste, owing to the presence of sodium sulphate. It cannot compete with Sambhar salt, being badly and expensively worked over and above its inferior quality. The cost of production, exclusive of interest on borrowed capital, comes to about 2½ annas per maund. The manufactured salt during the past four years has maintained an average of 3,701 tons. The season of production is from October to June.

BENGAL.

8. *BENGAL.*—The salt manufacture in Bengal is practically confined to Orissa, the control of which has recently (Government of India order No. 2143 S.R., dated 12th May 1897) been retransferred from Madras and placed under the Commissioner of Excise, Bengal.

Salt is manufactured in the District of Puri from the Chilka lake by solar evaporation. Beds 5 feet square and 6 inches deep each are dug out in the ground and the brackish water of the lake is admitted into them and allowed to evaporate. The water is kept in each bed for 24 hours and then transferred into another till the fifth day from the commencement of the evaporation, when the water being gradually thickened is converted into salt. Three to five men who are paid about 1½ annas a day each are generally employed to manufacture about 15 tons a week. The quantity locally manufactured is not always sufficient for the consumption of the district. More salt is imported from Ganjam and other districts. Estimated production in Puri is 5,963½ tons, valued at ₹4,36,318.

The salt manufacture in the District of Cuttack has practically been at an end. But that in the Puri District is carried on. There are two salt-producing tracts, (1) tract at the month of the river Deir, and (2) the tracts on the Chilka lake, wherein the manufacture is confined to Tua and Gurabaj.

Foreign Salt.

9. *FOREIGN SALT.*—The first recorded imports of foreign salt were in 1818-19, but the quantity remained small until 1835-36. The amount imported in 1852-53 was only 104,445 tons. The old stocks of salt manufactured at the Government agencies were exhausted in 1873-74, since which date the consumption over the whole of Bengal has been entirely met, or practically so, by foreign salt. Bengal salt supply at the present day is imported by Calcutta and Chittagong. The other ports that show imports of salt (Chandbali and Narainganj) deal with coastwise traffic from Calcutta or Chittagong.

The following statement may be given as fully expressing the Bengal traffic in salt. Local (Bengal) production is a very small factor, and the supplies obtained from Bombay and Madras (paras. 24, 38) are insignificant when compared with the foreign imports :—

Analysis of the Bengal Supply and Consumption of Salt.

Years.	Total Supply, Foreign and Indian. I.	Foreign Imports* (including Aden). II	Total Consumption, Foreign and Indian. III.
	Tons.	Tons.	Tons.
1870-71	259,549	217,668	287,94
1875-76	366,905	330,861	289,684
1880-81	347,122	304,904	318,322
1885-86	344,094	314,285	363,815
1890-91	359,570	337,526	359,503
1895-96	381,867	355,073	381,186
1896-97	308,004	292,682	384,740

* The Total Foreign Imports into India (for 1892-93 to 1896-97) will be found under para. 36 as also the chief countries of supply. Practically, the whole goes to Bengal (except about 40,000 tons to Burma), and the United Kingdom is by far the most important country of supply.

In some respects it may be said foreign salt does not at present compete with Indian production. It simply has possession of Bengal and Burma, while Indian salt similarly holds the other markets. Railway freight is the governing factor, Calcutta being remote from the seats of production. India possesses in the Salt Range alone enough salt to meet the demands of the whole world, but the sea freights from Europe are less than the railway charges from the mines or from the salt-yielding lakes and estuaries.

The quantity of salt imported to a very large extent is dependent on the freights ruling; if high, a decrease of imports occurs, the reverse being the case when a dearth prevails in other cargoes. Salt is brought to India by many "liners", especially those sailing from Liverpool, and by special vessels chartered for the jute trade which carry out salt practically as ballast. "Tramps" also occasionally bring coal to Port Said and then come on to India with salt from Ras Rowaya and Aden. Under para. 36 other particulars of the total imports of all India of foreign salt will be found. The present remarks refer to the supply drawn by Bengal. And it may be added by way of concluding this section that the opening of

Aden

SALT: PRODUCTION.

the East Coast Railway may be expected to bring Calcutta into comparatively easy touch with an important area of sea-salt production which is capable of considerable expansion. The future may thus be looked to as possibly likely to show direct competition of Indian with foreign salt.

The various classes of salt commonly imported into Calcutta may be grouped as follows:—

Description.

Manufactured by solar evaporation: Bombay, Madras, Ceylon, Jeddah, Muscat, Aden, Italy and [France.

Manufactured by boiling: Liverpool and Hamburg.

Rock Salt: Muscat.

BOMBAY:

10. ***BOMBAY.***—The districts concerned in the manufacture of salt in this Presidency are the following:—Ahmedabad and Surat in Guzerat; Thana, Kolaba, Ratnagiri and Kanara in Konkan. The salt consumed in the Western Presidency may be said to be of three kinds: (*a*) Baragara salt, (*b*) Sea-salt, and (*c*) imported salt.

Baragara.

(*a*) ***BARAGARA SALT.***—This is manufactured from sub-soil brine at two centres six miles apart, namely, Kharaghora and Udu on the borders of the Lesser Runn of Cutch. The land belongs to Government, and the salt is manufactured on Government account by men who are paid a fixed rate for salt that comes up to standard. This form of salt occurs in large cubical crystals from half to three quarters of an inch in diameter, each of which is built up of a number of smaller crystals. It is extremely hard and can be sent to great distances with remarkably little loss. The average quantity produced within the past five years has been 85,299 tons.

Sea-Salt.

11. (*b*) ***SEA-SALT.***—With the exception of four small groups of works, all the sea-salt works in the Presidency are located within a radius of 30 miles around the city of Bombay, and mainly in the Thana district. Practically all these works are owned by private individuals. Even the Government works are farmed out to persons who manufacture the salt on exactly the same conditions as the owners of private concerns. It may consequently be said that in Bombay the manufacture of salt is entirely a private industry conducted under license. (*Conf. with paras. 15, 26 and 35.*) The salt made is the property of the licensee, the price being fixed in the open market. There are no restrictions of any kind. The functions of the Salt Department are the safe custody of the salt produced (none can be removed except under permit) and the collection of duty on salt when removed.

The site chosen for a salt-works is usually on the shore of a creek or estuary, below the level of high tides and fully exposed to the influence of the prevailing winds. It is first surrounded by high embankments, the enclosed space being perhaps 250 by 80 feet. The space so enclosed is then divided by other walls into three sections—the outer reservoir, the inner reservoir, and the pan area. The space devoted to pans is carefully levelled and a floor of clay repeatedly puddled until it becomes water-tight. The pans are formed by small clay partitions, two feet broad, which run the whole length and breadth of the pan area crossing each other at right angles and thus forming a number of rectangular crystallising beds. The size of the beds vary, but 18 to 10 feet are common. The levels are so arranged that the water flows from the first reservoir into the second and from the second into the pans, being gradually concentrated as it flows from one basin to another. The water from the sea is admitted through a sluice and is thus exposed to evaporation till it forms brine. With this brine the pans are charged, to a depth of an inch and a half, and within a few hours in favourable weather, especially on shallow pans, a layer of crystal is formed, generally about one quarter of an inch in thickness. The salt is then racked on to the ridges and left to dry, and the pans are re-charged.

Ratnagiri.

The Survey Commissioner and Director, Land-Records and Agriculture, Bombay, has forwarded, for inclusion in this year's review, a report on the manufacture of sea-salt at Ratnagiri, prepared by the Assistant Collector, Salt Revenue, Ratnagiri Range:—The only salt-works in the district are those at Shiroda, where the process of manufacture is similar to that in vogue at Goa, and quite different from that which prevails in the Thana and Kolaba Districts. In the latter every agar has a large *khajina* or reservoir which is filled up at high tides, and one or more secondary reservoirs called *tapaonis*, in which the brine undergoes considerable condensation before it is admitted into the pans. In Shiroda each agar has in general a small so called *tapaoni*, but the brine is practically admitted into the pans direct from the sea every day. The salt is also removed daily. This rapid method gives the crystals little time to form, and Shiroda salt is consequently small grained, dirty looking stuff by comparison with that produced in the Northern Konkan. Nevertheless it is considered much superior to the latter in parts where the people have always been accustomed to it.

The preparation of the agars begins about the end of the year with draining them, after which the ground is ploughed and treated with *ghela* fruit (**Randia dumetorum**), so much used in Indian rivers for poisoning fish. The object of this is to kill some marine worm or mollusc which would spoil the floor of the agars with its burrows. The ground is then levelled and smoothed and divided into pans connected by a system of water-channels. The pans are very much smaller than those of the Northern Konkan works, measuring not more than 20 feet by 16.

The formation of salt begins usually in February and proceeds till stopped by the rains. It is scraped up daily, as I have said, with long wooden rakes, and heaped under the supervision of the officers of the Salt Department who are required to keep a regular stock account. When removed for export, it is weighed under the same supervision for duty. For some years past the owners have been allowed to dry it before presenting it for weighment by spreading for some hours in the sun. This makes it much lighter, and the lightest salt always commands the best price because it is sold in the retail shops by measure.

About 350 persons of the Agri caste find employment on the Shiroda works, and they are said to earn from R9 to 12 a month during the half year. From June to November they are engaged in the cultivation of rice, so they should be fairly prosperous.

Bombay sea-salt is composed of small crystals about one-eighth of an inch in diameter, but fine grain salt (the siftings and sweepings of the pans) is exported to Calcutta and the drift or flake salt—an excellent quality and whiteness—is reserved for the Bombay market. The season of production is from March to June. It varies, however, very greatly with the weather—cloudy sky and a low temperature during the hot weather retard evaporation and diminish the outturn. Unseasonable rain may stop manufacture entirely. The outturn depends in fact more on the date when the rains set in than on anything else. If the rains are late, the crop is a large one. In well-conducted works the cost of production is 6 pies per maund; the average is probably 9 pies. The table, para. 34, gives the total production of salt in Bombay during the past five years.

Bombay.

12. (*c*) ***IMPORTED SALT.***—This to a very small extent consists of European table salt. The manufacture of sea-salt in Bombay and Madras demonstrates what India can do in competition with foreign imports. The case of Calcutta is doubtless different in many respects from that of Bombay, its distance from the sea being an important factor in the existence of a large import trade in foreign salt. The chief imports into Bombay are coastwise and by road. During the past four years the total imports (foreign and Indian) have been, in 1893-94, 9,303 tons; in 1894-95, 11,413 tons; in 1895-96, 12,064 tons; and in 1896-97, 10,275 tons. Since the termination of the Goa treaty large quantities of salt have been drawn from that State to meet the necessities of the Southern Maratha country and part of Madras Presidency. This salt is sea-salt of good quality, closely resembling Bombay salt. Sind and the Persian Gulf ports also furnish Bombay with a quota of its salt.

Imported.

13. ***SIND*** has three main sources of supply, *viz.*, (*a*) Maurypur, (*b*) Saran, and (*c*) Dilyar.

SIND.

(*a*) ***MAURYPUR SALT.***—The following extract from the report of the Collector of Karachi describes the manufacture of this form of salt at the Maurypur salt-works, conducted under Government supervision Sixty-three *lunaris* or salt makers, are employed in the industry, and the earnings for the whole year amounted to R15,320. The salt is manufactured from sub-soil brine drawn from wells sunk on the premises. The brine is evaporated in pans into which the works are divided, one or more pans being allotted to each of the *lunaris*, who are paid a fixed price for all salt produced, *viz.*, 1 anna per maund. The salt is collected, washed, dried and stored on platforms. It is sold at the works to traders who are previously required to pay the price into the Government treasury. This salt supplies the greater part of Sind, part of it being issued from a Government Depôt at Sukkar. There are no salt-using factories in this district.

At Sirganda, on the Kori mouth of the Indus (adjoining the Runn of Cutch), vast deposits of salt exist, but these are not worked.

14. (*b*) and (*c*) The ***SARAN*** and ***DILYAR*** salt deposits are lakes from which the salt is obtained on the evaporation of the water by a process exactly similar to that in Rajputana. This salt is sold to the people of Thar and Parkar and the Hyderabad districts. Operations are generally conducted during the cold weather, when the water is at its lowest level.

Saran and Dilyar.

The total production of Sind usually averages 10,000 tons (*see para. 34*). The cost of production and storage of salt in Sind has been put at 15 pies per maund at Maurypur, and 9 pies at Saran and Dilyar.

15. ***MADRAS.***—Salt is obtained in the Madras Presidency exclusively by evaporation in 71 salt-works constructed for this purpose. These are distributed down the East Coast, manufacture on the West Coast having been abandoned. The collection of spontaneous salt or earth-salt is prohibited except at the salt-works at Pandraka at which spontaneous salt is collected and stored in the same way as salt regularly manufactured. It is reserved for export to His Highness the Nizam's Dominions. The manufacture of saltpetre is permitted under license, and the educed salt is allowed to pass into consumption on payment of duty, but in practice never does so, being destroyed by preference.

MADRAS.

There are two systems under which manufacture is allowed—the Monopoly and the Excise. The Monopoly system, under which all the salt is manufactured on behalf of Government, which pays the manufacturers and retails the salt at fixed prices, was originally in force all over the Presidency, but was almost entirely replaced in or about the year 1836 by the Excise system under which manufacturers are allowed to sell their salt as they please, subject to the payment of duty. It was anticipated that the Excise system would result through competition in a reduction of price and an improvemet nin quality, but the reverse has been the case, and to prevent the price to the consumer being unduly enhanced, Government has had to intervene, and the two systems are now practically working side by side.

Manufacture takes place in salt-works which are locally known as factories, being fenced-in enclosures, sometimes of several square miles in extent, which are intersected by channels for the supply of brine and transport of salt, and divided up by small ridges into brine condensers and crystallising beds. The brine remains on the average three or four days in the condenser, after which it is passed into the crystallising bed, where it takes generally two or three days to crystallise. It is then scraped in the majority of the factories, but in one or two, where what is known as the accretion system is in force, one layer is allowed to crystallise upon the top of another through successive flows of brine being evaporated in the same pan. It is removed the same day as it is scraped to fixed drying grounds, and thence, after it is dried, to guarded platforms where it is stored in heaps of uniform size. These precautions, which are taken in the interests of the Revenue, while they do not affect its chemical purity, reduce the size of the crystals considerably and thus affect Madras salt in its competition with the Bombay article.

16. The Madras Government has declined to allow the sifting process, except in cases where it forms part of a process for improvement in the quality as well as the saleability of the salt. The reason for this is that the duty being levied on the weight, and sale in the bazaar being by measure, large crystalled salt

SALT: CONSUMPTION.

presents an advantage only to the trader, the actual consumer on the other hand being a considerable loser in value for use. On this ground, the Madras Government urged on the Government of India the necessity for enforcing the retail sale of salt by weight, but its recommendation was not accepted.

The sifting process has, however, been allowed in certain cases for special reasons. It is also in use along with certain other processes for improving the whiteness and chemical purity of the salt by a company recently instituted whose endeavour is to secure the Calcutta market now held by imported salt.

The season of production varies with the rainfall, being earlier in the north and later in the south, and may be said roughly to be from November to June in the north, from December to July in the centre of the Presidency, and from March to October in the south, and the amount produced varies with the season as well as with the stocks in hand. In recent years stocks have largely accumulated under the Excise system, and as a result manufacture at present is being restricted by the licensees.

The average cost price of Government salt, exclusive of charges for guarding it, comes to about on anna six pies ; the cost to Excise licensees is not known, but it must be considerably less than two annas a maund. (*Information supplied by the Board of Revenue, Madras.*)

BURMA.

17. ***BURMA.***—To the above statement of the salt supply of India may be added very briefly some particulars as to Burma. The manufacture of salt throughout this Province is at present carried on under annual licenses which expire on the 31st December in each year. Throughoutboth Upper and Lower Burma salt is manufactured from brine-impregnated earth and in coast districts from sea-water. The brine is boiled down in earthen pots or in bowl-shaped iron cauldrons of from 2½ to 40 gallons capacity. The rate of taxation is regulated in direct relationship to the duty on foreign imported salt. The amounts manufactured by private persons holding licenses were during the past four years as follows :—in 1894, 17,581 tons ; in 1895, 19,316 tons ; in 1896, 17,613 tons ; and in 1897, 21,975 tons. There was thus an expansion in the local production of 4,362 tons (24·77 per cent.) over that of 1896 and an increase of 20·94 per cent. on the average of the three preceding years. The relative importance, however, of this industry to that in imported foreign salt may be shown by the following figures of the imports in 1893-94 (foreign 47,492+coastwise 1,651) 49,143 tons ; in 1894-95 (foreign 48,442+coastwise 2,717) 51,159 tons ; in 1895-96 (foreign 51,852+coastwise 5,041) 56,893 tons ; and in 1896-97 (foreign 35,317+coastwise 3,845) 39,162 tons.

ADEN.

ADEN.—During the calendar year 1897, 43,828 tons of salt were produced in the District of Shaikh Othman in Aden, valued at R2,59,798.

III.—AREAS OF CONSUMPTION.

The particulars dealt with in the foregoing remarks may be accepted as denoting the chief seats of supply or production. It may now serve a useful purpose to denote the markets or areas within which the various classes of salt are distributed. In dealing with this section, opportunity will be taken to exhibit certain details of the returns of trade for the year under review.

NORTHERN INDIA SALT: Sambhar.

18. ***NORTHERN INDIA SALT.—SAMBHAR SALT*** is more extensively used than any other over the greater part of the North-West Provinces, Oudh and Rajputana. It also penetrates into the south-eastern districts of the Panjab (bordering Rajputana), into Central India, and into a portion of the Central Provinces. In the north and north-west it meets in the cis-Indus districts of the Panjab the Rock Salt of that area, and in the direction of Bengal it overlaps the region of the imported foreign salt of the Lower Provinces. Towards the south of Rajputana and south and south-east of Central India it comes into conflict with Pachbadra salt and with the Baragara salt of Bombay. Similarly, in the Central Provinces it is found to be gradually contesting the markets with Pachbadra, Baragara, and Konkan salt.

Owing to the heavy sales of Sambhar salt in 1890-91, 1891-92, followed by the bad manufacturing season but continued high demands of 1892-93, the reserve stocks were overdrawn. To check this, the price of Sambhar salt had to be raised and the demand in 1893-94 (as was intended it should) naturally declined. But the year 1893-94 proved a remarkably good manufacturing one, and hence relative to 1892-93 the production manifested an almost unprecedented expansion. Sambhar salt was, however, temporarily displaced from portions of its natural area by Didwana, Pachbadra, and even by Baragara. The last-mentioned, fostered by the high prices demanded for Sambhar salt, found its way to a much greater extent than ordinarily into the districts of the North-West Provinces. The rock salt of the Panjab manifested little, if any, benefit by the opening afforded through the high prices that ruled for Sambhar salt. This illustration only serves, therefore, to demonstrate the mutual adjustments that at once take place should the necessary production in any one of the important centres be prevented.

Pachbadra.

19. ***PACHBADRA SALT.***—The area over which this salt formerly penetrated was very much greater than at present. It has been restricted through the greater facility of producing cheap salt at Sambhar. Its present markets may be said to be Udaipur, Bhopal, and Sagar.

Didwana.

20. ***DIDWANA*** in normal years supplies Rohtak, Hissar, Delhi and the Karnal districts of the Panjab and Mozaffernagar, Saharanpur, Meerut and Balandshahr of the North-West Provinces.

21. The ***ROCK SALT*** of the Panjab practically supplies the whole cis-Indus districts of that province north of the area of Didwana salt, and extends into Kashmir on the one side, Bahawalpur on the other. Throughout Kangra and Simla and portions of the adjacent districts, Mandi salt is almost exclusively used. To the west, the Indus forms a sharply dividing line, Kohat salt meeting all the demands of the trans-Indus tract.

The duty on Kohat salt was four annas a maund up to 1883 ; in that year it was raised to eight annas, and in 1896 this was increased to R2. The increase of the duty has been alleged by the Afridis to be one of the chief grievances which led to the frontier war of 1897.

22. ***Traffic in the Salt of Northern India.***—The following statement shows the production of salt during the past five years in the chief centres of this area :—

Traffic in Northern India salt.

Northern India Production of Salt.

	1893.	1894.	1895.	1896.	1897.
	Tons.	Tons.	Tons.	Tons.	Tons.
Sambhar	70,992	277,974	196,727	99,378	87,214
Other Rajputana Salt	11,821	61,377	51,997	35,680	31,260
Rock Salt	97,091	96,837	96,471	105,447	70,542
TOTAL	179,904	436,188	345,195	240,505	189,016

The above return purposely leaves out of account Mandi salt, Sultanpuri salt and the small amount of salt obtained as a by-product in the purification of saltpetre.

NORTHERN INDIA:

The statement of Rail-borne traffic (Appendix, *pages 78-81*) will be seen to exhibit the movements of salt of all kinds within India. From what has been already stated, it may readily be admitted that the exports from Rajputana and the Panjab can with safety be accepted as drawn from the sources indicated above. During the year under review, Rajputana exported in all 124,737 tons of salt. The major portion of this went to the North-West Provinces (*viz.*, 88·69 per cent.), and very much smaller quantities to the Panjab and the Central Provinces. The Panjab exported only 15,599 tons, the bulk of which also went to the North-West Provinces with a considerable quantity to Bengal.

The balance over these returns of exports of the figures of production may, for all practical purposes, be regarded as representing local consumption and surplus stock.

BENGAL: Foreign Salt.

23. ***BENGAL.***—As already indicated, the whole of Bengal proper, including Behar and rather more than half of Cuttack, are supplied by imported, mostly foreign, salt (*Conf. para. 9*). This meets the Chilka lake salt and the sea-salt of Ganjam, the rock-salt of the Panjab in Behar, and, passing across the geographical limits of Bengal, it also contests the markets of Sambhar salt in the frontier districts of the North-West Provinces. It penetrates into Nepal, Sikkim, Bhutan, and after supplying the wants of all the districts of Assam it overflows into the hill tracts on the north-eastern frontier. From Chittagong it is carried to the Lushai country and even across the frontier into the adjacent mountain tracts of Burma.

Traffic in Salt.

24. ***Bengal Traffic in Salt.***—To obtain some conception of the Bengal traffic in salt, it is necessary to tabulate the quotations of imports and exports by sea and land. The returns of the Rail and River-borne Trade show an export (*page 11, also 78*), during the past year, of 325,259 tons from Calcutta, the major portion of which (88·84 per cent.) went to the Bengal Province. The exports from the Province are unimportant and may be disregarded. Last year they came to only 2,697 tons consigned to Assam, the North-West Provinces, Central Provinces and Calcutta. Assam draws its chief supply from Calcutta, and last year this came to 21,028 tons. The North-West Provinces took 15,242 tons from Calcutta, and a very much smaller quantity went even to the Panjab. The imports into Calcutta by rail were only 40 tons, and the Province drew 3,805 tons chiefly, no doubt, of rock-salt from the Panjab, and more than double this amount of Madras salt.

Orissa Salt.

The bulk of the Bengal supply is of course derived from foreign countries. The returns given above (*page 3*) show a remarkable expansion in this traffic from 104,445 tons in 1852-53 to 292,682 tons in 1896-97. Last year, however, experienced a decline of 17·57 per cent. on the imports of 1895-96. But to obtain a full conception of the Bengal salt trade it is necessary to add to the figure just mentioned the quantities of Indian salt imported coastwise and the small local production of Orissa and Behar. From the table given (*page 11*) of the coastwise transactions in salt, it will be seen that the traffic has been on the whole steadily improving, although it declined slightly the last two years, due no doubt to the abnormally large foreign imports of 1894-95. The figures of the coastwise imports into Bengal were, in 1892-93, 23,707 tons; in 1893-94, 21,149 tons; in 1894-95, 27,358 tons; in 1895-96, 15,071 tons; and in 1896-97, 21,236 tons. Statement No. I (*page 72*) shows the manufacture to have been 8,507 in 1896 and 7,255 tons in 1897. This consists of the salt of Orissa and the salt from the saltpetre refineries of Behar. From 1892-93 Government took over the manufacture of salt on the Chilka lake, and not being in full operation in that year the output was but small (2,460 tons). It may be accepted that Orissa and Behar together during each of the past five years have not contributed more than 8,000 tons to the Bengal supply. But it may be added that, while an expansion of the Orissa production may be looked for under the new administration, that of Behar may be expected to decline. The statement (*page 9*) gives the returns of Orissa salt during the past five years.

BOMBAY: Baragara.

25. ***BOMBAY.***—The area over which Bombay salt penetrates is greater than that of any other salt met with in India. The BARAGARA salt permeates the whole of the northern tracts of the Presidency (including Kathiawar) as far south as Baroda. It extends into Rajputana, Central India and Malwa, contesting the markets of Pachbadra and Sambhar salt. It is still more largely distributed into the Central Provinces and even to the North-West Provinces (as for example in Hathras, Fyzabad, and Benares).

Sea-salt.

26. But the BOMBAY *SEA-SALT* has a far wider and more important area of distribution than the Baragara. It holds the whole country south of Baroda throughout the Province and to the far south in

SALT: CONSUMPTION.

the Nizam's Dominions and Mysore, with large quantities even conveyed to Travancore and Cochin. In recent years, Bombay salt exported by land has not penetrated into the Madras Presidency further than Kurnool. It is diffused through the Central Provinces and Berar, often side by side with Barágara salt, until it is met on the one hand by the small quantities of imported salt that find their way into the central Provinces and Chutia Nagpur, and on the other by the Sambhar salt in the North-West Provinces, and is exported by coasting vessels to Calcutta.

27. It has been stated that "the success of Bombay sea-salt in competition with other salts in the markets outside the Presidency is due to the enterprise of the Bombay traders, and the skill of the manufacturers in producing salt to suit the markets which they supply. For instance, much attention has been paid to the production of light salt; and as it is sold at the works and duty levied by weight, but retailed in the districts above the ghâts by measure, this gives the Bombay traders an advantage over those dealing in heavy salt." (*Conf. with para. 30 below.*)

SIND.

28. ***SIND.***—Practically all the salt manufactured is locally consumed. A small import in rock-salt from the Panjab takes place, and possibly a certain quantity of earth salt is carried across the frontier from the neighbouring Native States that surround the Province.

Traffic in Bombay and Sind Salts.

29. ***Traffic in the Salt of Bombay and Sind.***—Statement No. I (*page 72*) shows the production of last year to have been **404,374 tons**, a figure that manifests an increase on the previous year's production of 15·08 per cent., and which is practically the average of the three previous years. It may be useful to record here the production during the past five years, *viz.*, in 1893, 317,804 tons; in 1894, 438,229 tons; in 1895, 419,417 tons; in 1896, 351,366 tons; and in 1897, 404,374 tons. The rail-borne returns (*pages 11-12 and 78-79*) of all forms of salt from Bombay (Port Town and Province) show the exports to have been **128,57 tons** from the Province, and 4,082 tons from the port town. Of the former amount, the Central Provinces took 45,319 tons, the Nizam's Dominions 22,195 tons, the North-West Provinces 15,045 tons, Rajputana and Central India 14,607 tons, Berar 13,889 tons, and Mysore 12,693 tons. Of the latter, the (port town) exports by rail went mainly to the Nizam's Dominions, with smaller quantities to the Bombay Presidency and Mysore. The Sind exports by rail were purely nominal (54 tons), but Karachi exported last year 7,591, nearly the whole of which went to the Province. The coastwise transactions will be seen from the table below (*page 11*), but it may be here remarked that Bombay furnishes nearly three times as much as it imports. Further, its imports last year, *viz.*, 54,680 tons, came from other ports in the Presidency to the port town of Bombay. Of the 141,058 tons exported by all Indian ports, Bombay town gave 134,370 tons. Of that amount, Madras took 42,522 tons, Bengal 20,920 tons, Travancore 10,769 tons, Goa 1,073 tons, and other British ports in the Bombay Presidency 54,675. Practically, it may be said that, after leaving out of account the interchanges between Bombay port town with other ports within the Presidency, the coastwise exports in Indian salt are from Bombay port town to Madras, Bengal and Travancore. The consignments to Goa are more than compensated for by the rail-borne exports from Goa to the Maratha Country.

MADRAS.

30. ***MADRAS.***—Except for the quantity above stated as imported by land from Bombay and for the sea imports to the West Coast, the whole of the salt consumed in the Madras Presidency is produced in the local factories. Salt is also exported from these to Mysore, the Nizam's Dominions and the Central Provinces, the total of such exports being estimated at 10,795 tons. These exports are expected to be largely developed on the completion of the East Coast Railway. Export also takes place by sea to Rangoon, Mauritius, Penang, Singapore and Calcutta, and some individuals are making great efforts to gain a footing in the Calcutta market. The imports are almost entirely from Bombay. The reasons which enable the Bombay salt to compete on favourable terms with the Madras salt are stated above, being in brief that the Bombay Government allows its manufacturers to adopt processes favouring the trader against the consumer which the Madras Government has refused to permit, at the same time that the latter in the interests of the revenue imposes restrictions on the process of manufacture itself which are not enforced by the former.

Traffic in Madras Salt.

31. ***Traffic in the Salt of Madras.***—Statement No. I (*page 72*) shows the production of salt in this Province to have been **240,796 tons** during the year under review. That production represents decrease of 30·71 per cent. on the figure of 1896 and of 27·82 on the average for the past three years. From what has been stated, however, it will be understood fluctuations in the returns of evaporation salt cannot be regarded as prognostications of any decline in the trade. They may be due to bad manufacturing seasons or to large accumulated reserve stocks. This idea is fully borne out by the returns of production for the past five years, *viz.*, 269,138 tons in 1893; 326,501 tons in 1894; 326,905 tons in 1895; 347,545 tons in 1896, and 240,796 tons in 1897.

The rail-borne trade of Madras Presidency shows an export of **17,172 tons**, or as much as four times the exports of 1893-94 (*see pages 11 and 78*). More than half of these exports went to Bengal and the remainder to the Nizam's Dominions and Mysore. The port towns of Madras, however, exported by rail a very much larger quantity, namely, **75,219 tons**, which was distributed all over the Presidency with small quantities consigned to Mysore and the Nizam's Dominions. The coastwise traffic has already been indicated under Bombay. It is chiefly the growing demand for the light salt of the Western Presidency. The exports were 4,852 tons—a figure that will be observed to be not very stationary from year to year (*page 11*), and these exports are largely to Calcutta.

ASSAM.

32. ***ASSAM.***—In addition to the supply from Calcutta, reference was made in last year's review to the import of rock-salt across the land frontier. The salt in question is imported by the Bhutias of Bhutan and Towang, and also by the Abors, Mishmis and other tribes inhabiting the hills to the north of the Assam

Valley. It is valued at R4 to R5 a maund, and is bartered with the inhabitants of the submontane villages for rice. It is usually consumed by the villagers who trade with the Bhutias, and is not re-exported from the Province. The statement below shows the quantity and value of the rock-salt imported into Assam in the year 1897-98 :—

	Quantity. Maunds.	Value. R
From Bhutan	157	786
From Dowang	188	940
From Abor, Mishmi, etc., Hills	95	455
TOTAL (= 16 tons)	440	2,181

The rail and river-borne trade between Bengal and Assam will be seen by the tables, pages 12 and 78. The total imports last year came to 23,508 tons.

IV.—IMPERIAL TRAFFIC.

33. By way of concluding this review of the features of last year's Production and Consumption of Salt, it may be as well to furnish certain statistical information that is best exhibited for the provinces of India collectively.

Production.

34. ***PRODUCTION OF SALT IN INDIA.***—The following table may be given of the chief items of production, classified more or less on the plan of the foregoing remarks. The totals differ from those of Statement No. I (*page 72*) mainly through the exclusion from this analysis of the salt made in Aden and that in the Native States of Cutch and Kathiawar :—

	1893.	1894.	1895.	1896.	1897.
	Tons.	Tons.	Tons.	Tons.	Tons.
NORTHERN INDIA.					
Sambhar	70,992	277,974	196,727	99,378	87,214
Other Rajputana salts	11,821	61,377	51,997	35,680	31,260
Panjab and Kohat mines	97,091	96,837	96,471	105,447	70,542
Mandi, Sultanpur, Gwalior and the Saltpetre refineries of Bengal and North-West Provinces and Oudh and the Panjab	9,845	10,381	12,307	12,774	11,318
BOMBAY.					
Sea-salt and Barágara	308,613	430,059	408,553	341,948	394,122
SIND	9,191	8,170	10,864	9,418	10,252
MADRAS.					
East coast sea-salt	269,138	326,501	326,905	347,545	240,796
BENGAL.					
Orissa sea-salt	565	7,709	6,532	7,137	5,942
BURMA.					
Sea coast salt and Brine wells	13,234	17,517	19,245	17,365	21,895
TOTAL	790,490	1,237,025	1,129,601	976,692	873,341

Private Enterprise.

35. ***GOVERNMENT AND PRIVATE ENTERPRISE.***—From the frequent mention that has already been made of the extent to which salt manufacture is passing into the condition of private enterprise, it will not be necessary to comment on the returns shown in the following table :—

Analysis of the Published Returns of Indian Marine Salt.

	1897.		1896.		1897.	1896.
	Manufactured by Government.	Manufactured otherwise than by Government.	Manufactured by Government.	Manufactured otherwise than by Government.	TOTAL.	TOTAL.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Madras	64,769	176,027	119,283	228,262	240,796	347,545
Bombay and Sind	98,820	305,554	122,899	228,467	404,374	351,366
Bengal	5,942	1,313	7,137	1,370	7,255	8,507
TOTAL	169,531	482,894	249,319	458,099	652,425	707,418

SALT: TRADE.
Foreign Imports.

36. ***FOREIGN IMPORTS.***—In this connection and in continuation of the remarks, paragraph 9, it may be desirable to give here a brief statement of the traffic in Foreign Salt, imported into India during the past five official years :—

Salt imported into all India from Foreign Countries.

	Tons.	Annual average cost per 100 maunds.	Percentage of increase or decrease in value on preceding year.
		₹ a. p.	
1892-93	360,042	61 9 3	—4·89
1893-94	412,876	77 12 11	+26·35
1894-95	508,375	60 10 6	—22·04
1895-96	407,271	57 14 0	—4·58
1896-97	328,304	96 0 9	+65·95

In order to indicate the countries from which these foreign supplies were drawn, the following table may be given :—

Countries from which India imports Salt.

	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.
	Tons.	Tons.	Tons.	Tons.	Tons.
United Kingdom	241,061	268,715	314,733	262,528	193,084
Germany	47,391	47,811	82,156	62,208	37,450
Arabia	25,887	21,475	19,418	11,068	13,450
Aden *	37,282	51,051	44,456	26,105	40,663
Other Countries	8,421	23,824	47,592	45,362	43,657
TOTAL IN TONS	360,042	412,876	508,375	407,271	328,304

Consumption in relation to imports.

37. ***IMPORTS IN RELATION TO CONSUMPTION.***—The relation of imported salt to local manufactures specially along the coast may be shown by the following table :—

Consumption in relation to Imports in 1896-97.

PROVINCE.	Total consumption (official year).	Quantity imported (official year).	Percentage of imported salt to total consumption in 1896-97.	Percentage of imported salt to total consumption in 1895-96.
	Tons.	Tons.		
Bengal	384,740	292,682	76·07	93·14
Madras	293,651	81	·027	·022
Bombay, including Sind	253,635	224	·088	·108
Northern India	274,791	...	...	...
Burma	39,870	35,317	88·58	113·87
TOTAL	1,246,687	328,304	26·33	32·08

* For annual Production of Salt in Aden, see Statement I, page 72.

V.—INTERNAL OR PROVINCIAL TRADE IN SALT.

38. ***COASTWISE TRANSACTIONS.***—By way of concluding this brief review of the Production and Consumption of Salt in the various provinces of India, it is only necessary now to show the shares in the traffic of distribution accomplished coastwise and by rail and river:—

Imports and Exports of Indian Salt Coastwise.

		1892-93.	1893-94.	1894-95.	1895-96.	1896-97.
		Tons.	Tons.	Tons.	Tons.	Tons.
Bengal	Imports into	23,707	21,149	27,358	15,071	21,236
	Exports from	*Nil.*	*Nil.*	*Nil.*	*Nil.*	*Nil.*
Bombay	Imports into	42,312	43,791	46,910	46,830	54,680
	Exports from	141,294	134,122	157,778	140,599	134,370
Sind	Imports into	205	205	281	281	240
	Exports from	208	211	286	280	242
Madras	Imports into	45,996	39,704	43,424	49,994	45,522
	Exports from	4,160	2,742	4,578	3,444	4,852
Burma	Imports into	1,702	1,626	2,626	5,041	3,845
	Exports from	2,143	1,813	2,438	3,177	1,594
TOTAL	Imports	113,922	106,475	120,599	117,217	125,523
	Exports	147,805	138,888	165,080	147,500	141,058

The interest in the coastwise trade in salt centres in the Bombay exports and in the extent to which these, both by coast and rail, are being distributed over India.

39. ***RAIL-BORNE TRADE.***—The amount of salt carried on the railways and by boats and steamers on the rivers has been fully commented on in the Chapter on Areas of Consumption, but it may serve a useful purpose to give in this place an abstract of the returns during the past five years:— Rail-borne Traffic.

Imports and Exports of Salt, carried by Rail and River, during 1892–97.

		1892-93.	1893-94.	1894-95.	1895-96.	1896-97.
British Provinces. (*Excluding Chief Seaports.*)		Tons.	Tons.	Tons.	Tons.	Tons.
Bengal	Imports into	289,480	276,716	296,507	282,342	302,930
	Exports from	4,276	3,600	3,136	4,873	2,697
Bombay	Imports into	827	854	1,110	937	845
	Exports from	111,900	131,643	122,210	121,221	128,571
Sind	Imports into	7,466	7,387	7,440	7,904	7,980
	Exports from	71	116	111	87	54
Madras	Imports into	83,566	86,785	85,188	83,410	77,880
	Exports from	5,792	4,241	7,138	7,716	17,172
N.-W. P. and Oudh	Imports into	164,621	150,594	142,557	148,852	152,578
	Exports from	2,903	2,643	2,481	2,549	2,464

SALT: TRADE. PROVINCIAL: Rail-borne Traffic.

Imports and Exports of Salt, carried by Rail and River, during 1892–97.

		1892-93.	1893-94.	1894-95.	1895-96.	1896-97.
		Tons.	Tons.	Tons.	Tons.	Tons.
British Provinces—continued.						
(*Excluding Chief Seaports*)—continued.						
Panjab	Imports into	12,098	9,315	10,093	10,335	10,210
	Exports from	16,299	14,023	14,940	15,173	15,599
Central Provinces	Imports into	54,265	57,685	57,868	56,691	49,707
	Exports from	860	872	925	799	657
Berar	Imports into	14,640	15,612	14,809	14,943	14,111
	Exports from	2	20	6	15	33
Assam	Imports into	22,989	20,581	23,927	23,597	23,508
	Exports from	18	28	27	8	30
Total of Provinces	Imports	649,952	625,529	639,499	629,711	639,744
	Exports	142,121	157,186	150,974	152,441	167,277
Native States.						
Rajputana and Central India.	Imports into	14,340	17,406	15,964	16,661	17,031
	Exports from	143,956	117,723	117,068	120,110	124,737
Nizam's Dominions	Imports into	31,171	28,178	32,037	29,546	29,768
	Exports from	87	48	54	80	105
Mysore	Imports into	16,246	16,604	16,388	17,131	15,437
	Exports from	7	7	2	25	16
Total of Native States	Imports	61,757	62,188	64,389	63,338	62,236
	Exports	144,050	117,778	117,124	120,215	124,858
Chief Seaports.						
Calcutta	Imports into	125	85	61	1,567	40
	Exports from	318,531	301,773	326,455	316,178	325,259
Bombay	Imports into	22	23	29	24	33
	Exports from	12,196	15,373	15,077	16,124	4,082
Karachi	Imports into	1	5	13	8	2
	Exports from	7,092	7,079	7,088	7,545	7,591
Madras ports	Imports into	18	2	295	841	2,229
	Exports from	87,885	88,643	87,578	82,486	75,219
Total of Seaports	Imports	166	115	408	2,440	2,306
	Exports	425,704	412,868	436,198	422,333	412,151
Grand Total	Imports	711,875	687,832	704,296	694,989	704,286
	Exports	711,875	687,832	704,296	694,989	704,286

II.—COAL (*Kóyelah*, HIND.).

COAL: PROSPERITY and OUTTURN.

VI.—PROSPERITY AND OUTTURN OF THE INDIAN COAL MINES.

Production.

40. Coal production in India continues to expand in a most significant manner. The output in 1894 came to 2,820,652 tons. The output will be seen, Statement No. I (*page 73*), to manifest for 1897 a production of 4,063,127 tons valued at R1,24,66,588. That is to say, an expansion of 5·59 per cent. on the returns of 1896 and of 19·47 per cent. on those of the average for the three previous years. The commercial imports of foreign coal in 1897 (excluding coke, patent fuel and Government stores) came to 481,036 tons, being a decrease of 35·59 per cent. on the previous year's returns. When it is recollected that coal in India is entirely used up by the shipping, railways and factories, and that there is practically no demand for domestic purposes, the full significance of the figures of production and import are obtained. They represent directly the magnitude of India's commercial dealings with the world, the improvement in the facilities of internal communication, and the advancement of her manufacturing enterprise.

Import Traffic.

41. The output of the Indian mines, seventeen years ago (say the average of the years 1879, 1880 and 1881), was just under one million tons, and India's total supply of coal was then approximately 1,500,000 tons. The amounts recorded above as the production and imports of 1897 show a total of 4,544,163 tons, or a figure which approaches last year's total Indian and Foreign supply.

As against the prosperity indicated by the increased demand for coal, it may be pointed out that the import traffic in the mineral has for some years past practically remained stationary (*para. 44*), instead of expanding commensurately with the necessities for fuel. With the exception of the supply drawn by Bombay, the foreign coal traffic might be almost characterised as an adjustment of imports on exports rather than the supply of a commodity for which there is a steady demand. Indeed, it might be affirmed that the extinction of the trade is but a matter of time. Everything in fact points to a prosperity for the coal-mining industry that will eclipse even the achievements of the past few years.

Extinction of Imports.

Since the appearance of the Review of Mineral Production in India for 1896, Professor W. R. Dunstan, F.R.S., the Director of the Research Department of the Imperial Institute, has drawn up a report on the Indian coal supply, to which is appended a table of analyses of samples from all the more important collieries. It is not intended to reproduce in this Review any of the interesting results obtained by Professor Dunstan. The Report is being printed separately and will appear as an *Agricultural Ledger*, No. 14 of 1898.

VII.—REGIONS OF PRODUCTION AND SUPPLY.

PRODUCTION.

CHARACTER OF INDIAN COAL:

42. With the exception of Bombay, Sind and Mysore, practically all the other Provinces and Native States contain coal. India in fact possesses an inexhaustible store of the mineral. But none of it belongs to the so-called carboniferous period of geologists. Indeed, the Indian coal-measure rocks are not all of one formation. The coal of Peninsular India occurs in the Gondwana system, the fossil flora of which has mesozoic facies. The coal of extra-Peninsular India occurs in rock of cretaceous or tertiary age. The Gondwana beds are found in the Central and North-Eastern Provinces (*e.g.*, Western Bengal, the Central Provinces and the Nizam's Dominions) with scattered patches in the extreme north-east of the Madras Presidency. The tertiary coal may be traced along the outer margin of the Indo-Gangetic plains from Sind to Pegu, but it is only in Assam and Upper Burma that valuable cretaceous coal is met with. Some of the Indian deposits have only very recently been tapped and large areas rich in the mineral remain untouched, so that even the very encouraging results of the past two years' operations may be said to give but a foretaste of future possibilities.

Number of Collieries.

43. During the year under review there were 145 collieries at work, distributed as follows: 128 in Bengal; one in Madras; two in the Panjab; two in the Central Provinces; seven in Assam; one in Burma; one in Central India; one in the Nizam's Dominions; and two in Baluchistan. In 1896 there were 172 collieries; in 1895 there were 235 collieries; in 1894, 123 collieries; and in 1893 only 96 collieries. There has thus been a decrease of 27 collieries during the past year, and a decrease of 31 on the average of the past three years. The labour force in 1897 has been returned at 59,859; in 1896 as 61,958; in 1895 it was given as 57,919; in 1894 as 43,197; and in 1893 as 37,679. It seems probable, however, that the figures of labour are not very complete. The census of 1891 gives the coal miners for that year at 35,512, whereas in the annual returns of the mines it stood at 34,827.

Producing Collieries.

The following statement may be given as the production since 1878, the qualification being offered that the returns of the earlier periods there shown are believed not to have been so accurate as those of recent

COAL: PRODUCTION.

years. The table as it stands, however, is instructive since it exhibits the relative dates of starting and the comparative production values of the great coal-bearing localities of India:—

Quantity, in Tons, of Coal Produced in the Provinces of India.

Indian Mines.

Years.	Madras.	Bengal.	North-Western Provinces and Oudh.	Panjab.	Central Provinces.	Assam.	Burma.	Central India.	Nizam's Dominions.	Baluchistan.	Total.
1878 .	...	957,243	...	...	57,967	...	...	...	...	...	1,015,210
1879 .	...	891,047	...	...	33,515	...	...	...	...	...	924,562
1880 .	...	988,565	...	...	31,228	...	...	...	...	...	1,019,793
1881 .	...	930,203	...	...	67,527	...	...	...	...	...	997,730
1882 .	...	1,038,872	...	...	91,370	...	...	...	...	...	1,130,242
1883 .	...	1,200,957	...	...	115,019	...	...	...	...	...	1,315,976
1884 .	...	1,257,392	...	...	121,833	16,493	...	2,100	...	...	1,397,818
1885 .	...	1,123,700	...	...	119,116	43,707	...	7,698	...	...	1,294,221
1886 .	...	1,186,802	...	...	117,287	70,859	...	13,539	...	...	1,388,487
1887 .	...	1,319,090	...	7,523	128,981	89,302	...	15,497	3,259	411	1,564,063
1888 .	...	1,380,594	...	11,249	157,768	101,528	...	41,580	13,382	2,802	1,708,903
1889 .	...	1,541,356	...	22,835	144,465	116,676	...	52,956	59,646	8,238	1,946,172
1890 .	...	1,626,245	...	40,677	137,022	145,708	...	77,842	125,486	15,541	2,168,542
1891 .	20	1,747,122	...	60,714	141,736	154,208	...	69,741	144,668	10,368	2,328,577
1892 .	61	1,920,050	...	66,352	132,005	164,050	3,670	88,623	149,601	13,284	2,537,696
1893 .	502	1,902,866	...	77,294	135,118	164,420	9,938	94,348	157,421	20,094	2,562,001
1894 .	1,337	2,035,934	...	66,467	140,495	169,448	12,111	132,837	240,525	21,498	2,820,652
1895 .	1,737	2,716,155	...	72,493	123,776	172,717	17,289	118,479	292,915	23,259	3,537,820
1896 .	...	3,037,920	1,000	79,017	141,185	177,259	22,993	115,386	262,681	10,572	3,848,013
1897 .	...	3,142,497	...	92,792	131,629	185,533	11,472	124,778	365,550	8,876	4,063,127

POSITION and PROSPECTS. FOREIGN SUPPLY.

VIII.—PRESENT POSITION AND FUTURE PROSPECTS.

44. *FOREIGN COAL.*—It may now be desirable to exhibit some of the leading characteristics of the areas of supply, somewhat after the manner attempted above with salt, *viz.*, to denote the markets met by the various coal-producing centres. Imported foreign coal, as in the case with imported salt, will accordingly be treated as a centre of supply, and it will perhaps elucidate matters if the imports be disposed of in the first instance. The following table may be given of the total imports for the past fifteen years:—

Analysis of Imports of Foreign Coal into India during the past fifteen years.

(Coke and Patent Fuel, as also Government Stores, have been excluded from columns 1 to 6, but included in the Grand Totals, Column 7.)

Countries from whence obtained.

Conf. with page 24.

Years.	1 Into Bombay.	2 Into Sind.	3 Into Madras.	4 Into Burma.	5 Into Bengal.	6 Total.	7 Grand Total, including Coke, Patent Fuel and Government Stores.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1882-83	420,055	10,857	24,460	95,305	74,610	625,287	652,347
1883-84	491,776	17,593	28,294	78,312	62,534	678,509	712,900
1884-85	504,875	18,161	28,826	84,779	62,536	699,177	757,673
1885-86	528,499	35,769	34,662	63,091	97,047	759,068	805,700
1886-87	521,455	40,282	38,232	81,224	46,923	728,116	780,959
1887-88	572,358	38,803	28,204	111,589	49,206	800,160	886,680
1888-89	638,159	41,515	35,874	77,741	17,176	810,465	877,843
1889-90	431,200	31,596	41,662	47,036	21,297	572,791	656,867
1890-91	628,678	48,992	46,392	35,999	7,571	767,632	817,004
1891-92	561,651	53,053	41,528	47,843	20,120	724,195	773,624
1892-93	498,652	34,475	63,929	26,966	10,727	634,749	703,341
1893-94	423,094	32,677	63,206	19,230	5,799	544,006	591,007
1894-95	647,917	40,469	79,378	34,405	6,544	808,713	848,367
1895-96	559,709	40,533	108,337	32,271	6,000	746,850	787,114
1896-97	362,223	15,328	69,637	28,028	5,820	481,036	519,379

COAL: POSITION and PROSPECTS.

45. Column 1 shows the transactions with Bombay and as stated in last year's review, it will be at once perceived that the supply drawn from foreign countries has certainly not expanded concomitantly with the expansion of the manufacturing industries of the Western Presidency Indeed, during the past year the foreign imports taken by Bombay are 35·30 per cent. less than those of the previous year. The relation of the foreign coal supply to the Bombay mills may be exemplified as follows:—

FOREIGN CONTRIBUTION.

Analytical Statement of the Cotton Mills of India.

Cotton Mills and their Coal supply.

YEARS.	Number of Mills.	Number of Looms.	Number of Spindles.	Number of persons employed.
1881-82 . .	62	14,386	1,550,944	52,231
1886-87 . .	90	16,926	2,202,602	72,590
1891-92 . .	127	24,670	3,268,524	117,922
1892-93 . .	130	26,317	3,378,303	120,898
1893-94 . .	137	29,392	3,539,681	130,570
1894-95 . .	143	34,161	3,711,669	139,578
1895-96 . .	147	37,278	3,844,307	146,244
1896-97 . .	154	37,303	3,975,719	148,997

Bombay.

46. To bring out the full bearing of the figures displayed in the above table, on the question of the coal supply of Western India, it is only necessary to add that the cotton spinning and weaving industry of India centres mainly in the Bombay Presidency—one might almost say in the town and neighbourhood of Bombay itself. In 1892-93, out of the total of 127 mills, 88; in 1893-94, out of the total of 137 mills, 95; in 1894-95, out of the total of 143 mills 99; in 1895-96, out of the total of 147 mills, 101; and in 1896-97, out of the total of 154 mills, 105, were in Bombay. It will thus be observed that the returns of the imports of foreign coal into Bombay give no indications of having responded to the uniform and steady expansion of this great and important industry. And to the above table might have been added the figures to show the remarkable increase that has taken place throughout Western India in factories for ginning, cleaning and pressing cotton. In 1896-97, these were returned as 224 in number, the total for all India having been 559. On the other hand, the trade revealed by columns 2 and 3 (table, page 14, *vis.*, the imports into Sind and the imports into Madras) may be said to have manifested a slow though steadily increasing demand

Sind. Madras.

for foreign coal. The rail-borne traffic from the Nizam's Dominions into Madras shows, however, an even more remarkable increase in the supplies drawn from the Singareni and Madras mines. Thus in 1892-93, the Madras imports of Indian coal were 58,220 tons (page 19), and in 1896-97 they came to 129,905. During the same periods the Madras seaports took of Indian coal 980 tons (page 20) in 1892-93, and 12,710 tons in 1896-97, a very remarkable increase. A further examination of the rail-borne traffic (pages 82-83) demonstrates the fact that the bulk of these quantities were derived from the Nizam's Dominions, *vis.*, 86,433 tons taken by the Madras Presidency, and 3,843 tons by the port towns.

Nizam's Dominions.

Burma.

47. The decline in the consumption by Burma of foreign coal, shown in column 4 (*table on page 14*), is doubtless due to some extent to the majority of the 66 rice mills of that province having almost simultaneously adopted the system of using up the rice husk as the fuel to drive their machinery. But in this connection it must be pointed out that Bengal coal has within the past few years entered into direct competition with the foreign supply obtained by Burma. On page 19 the coastwise traffic will be seen to have been fluctuating during the past five years and to have declined from 123,152 tons in 1895-96 to 74,736 tons in 1896-97. The imports into Bengal (page 14, column 5) show so uniform and constant a shrinkage of the supply of foreign coal that it is impossible to avoid the belief of its being the reflex action of the expansion of the Bengal local production.

Bengal.

INDIAN PRODUCTION.

INDIAN COAL.—The areas at present open to foreign coal are therefore Bombay and Sind, Madras, and to a certain extent Burma. In another paragraph will be more fully displayed the strong competition that already exists for these markets, through local production. And it may be affirmed that the future will see a rapidly augmented competition on the part of the Indian mines.

Bengal.

48. ***BENGAL.***—During the year under review the mines of this province turned out 3,142,497 tons. The value of that amount has been returned as R79,15,781. This Bengal production thus represents nearly 77 per cent. of the total for all India. It is also an expansion that amounts to 21·02 per cent. on the provincial average production for the years 1894—96. During the year there were 128 collieries at work in Bengal, as compared with 154 in 1896, 220 in 1895, 109 in 1894, and 82 in 1893. These collieries may be grouped according to the districts in which they occur, and their present comparative values indicated by the figures of last year's outturn:—

Burdwan	Collieries	2,033,089 tons.
Bankura	,, ...	9,922 ,,
Hazaribagh	,, ...	660,665 ,,
Manbhum	,, ...	434,586 ,,
Sonthal Parganas	,, ...	2,879 ,,
Darjeeling	,, ...	1,356 ,,
Total Production of Bengal Collieries . . .		3,142,497 tons.

COAL: POSITION and PROSPECTS. INDIAN SUPPLY.

Bengal.

In the Burdwan district occur the following groups of mines:—the Raniganj, Kali-pahari, Asansol, Sitarampur, and Barakar—82 mines in all. In Hazaribagh, the Giridih series, 6 mines. In Manbhum, 33 mines, in the Sonthal Parganas, 3 mines, and in Bankura 3 mines. It would perhaps be beyond the scope of a review of the year's production to go into much detail regarding these Bengal mines, but a few statements regarding some of the chief fields may be here given in order to show the estimated available supply and consequently future prospects.

Of the *KARHARBARI* mines (Giridih)—200 miles from Calcutta—it has been stated that the field covers 8 square miles. The coal occurs in three principal seams. The estimated amount of coal has been put at 136,000,000 tons. The first mine opened in this field was the Kuldiha (1869), the Karharbari following in 1871. The Jubilee pit is 650 feet deep and is supposed to be the deepest coal shaft in India. These collieries are worked in connection with the East Indian Railway and the entire supply of fuel is drawn from them and the Serampur mines.

The *RANIGANJ-BARAKAR* coal field is about 130 miles from Calcutta. It covers 500 square miles with perhaps double that area dipping below the alluvial bed to the east. The available coal from these fields has been put at 14,000,000,000 tons. The first mine opened was the Raniganj in 1820.

JHERIA, in the valley of the Damuda and 16 miles west of Raniganj (District of Manbhum), has a field of 200 square miles calculated to contain 465 million tons.

BOKARO, two miles west of the Jheria field, covers 220 square miles, some of the seams of coal area 83 feet in thickness The coal stored up in this bed has been computed at 1,500 million tons.

RAMGARH lies south of Bokaro. It is comparatively a small field, about 40 square miles, and is estimated to contain 5 million tons of available fuel.

NORTH KARANPURA is situated at the head of the Damuda valley. It has an area of 472 square miles and is said to contain 8,750 million tons of coal.

SOUTH KARANPURA is situated to the south-east of the northern field and is supposed to have 75 million tons of coal.

DALTONGANJ, in the valley of the Koel in Lohardaga district, covers an area of 200 square miles and is estimated to contain 11,600,000 tons of excellent fuel.

TALCHIR in Orissa, a coal field of some 700 square miles in extent, is situate in the valley of the Brahmini. The coal is believed to be of inferior quality, but the field has not as yet been fully surveyed.

RAJMAHAL on the western margin of the hills of that district, is a coal field 70 square miles in extent.

DARJEELING coal field is not very important. It occupies a narrow zone which stretches along the foot of the Himalaya from Pankabari to Dalingkote. The coal is of Gondwana age, but much crushed, assuming the character of graphite.

Central Provinces.

49. *CENTRAL PROVINCES.*—The mines of these provinces are located in the following districts, and yielded last year the amount shown:—

Narsinghpur (*MOHPANI* Mines)	19,975 tons.
Chanda (*WARORA* Mines)	111,654 ,,
Total Production of Central Provinces Collieries . . .	**131,629 tons.**

These returns show a decrease on the production of 1896 of 6·76, and on the average of three previous years a decrease of 2·36 per cent. The decline indicated has been entirely in the Government mines of Warora.

The *MOHPANI* field has its importance through its position with reference to the Great Indian Peninsula Railway. It is 95 miles by rail, west-south-west of Jabalpur. The mining operations in this field are hindered on account of the floodings during the rains and the occurrence of underground fires. *WARORA* (including the Ghugus, Wun, Papur, Sasti, Paoni fields) has been estimated to contain 1,714 million tons, but of this wide area only Warora is being worked. The average number of persons employed daily in this colliery in 1897 was 1,511. The decrease in the outturn, it is explained, was due to smaller demands from petty customers, owing to a less favourable cotton crop. The Great Indian Peninsula Railway was supplied with 56,342 tons of large coal during 1897, against 58,098 tons in the previous year. The price charged to the Railway was R4-8-0 a ton at the pit's mouth and the average selling price being R4-7-4 per ton. Besides the fields actually worked, there are others worthy of mention, such as the *SHARPUR* and *PENCH*. The former occurs on the south of the Tawa Valley. It contains seams of irregular thickness and inferior quality. The latter contains many seams of fair quality. *KORBA*, *MAND*, *RAIGARH-HINGIR* fields, in the Mahanadi Valley, cover an area of 1,000 square miles, and some of the seams of coal are very thick, two having been ascertained to be 90 and 168 feet, respectively. The Korba area has so far proved the most worthy of consideration as the coal is of good quality

Central India.

50. *CENTRAL INDIA.*—The only coal field of this area at present being worked is that of *UMARIA* in Rewah. The output last year came to **124,778 tons**, valued at R3,95,655, the increase being due to the extension of works. Its great value lies in its position, 34 miles from Katni station on the East Indian Railway, and tapped by the Katni-Bilaspur branch. It is consequently the nearest source of supply for the North-West Provinces and the Panjab, the Indian Midland Railway being the chief consumer. This fact may be fully exemplified by an examination of the rail-borne returns. The exports of coal from Central India were returned in 1892-93 as 75,363 tons, in 1896-97 they stood at 89,599 tons, and of the last-mentioned quantity the North-West Provinces and Oudh took 39,814 tons, the Central Provinces 46,281 tons, Bombay 3,316 tons, and the Panjab 187 tons. (*See pages* 82, 83.) The Umaria field has an

area of three square miles and has been estimated to contain 28 million tons of coal. But besides Umaria, there are other coal fields in Central India of which the following may be mentioned:—*SOHAGPUR*, an excellent coal field of 1,600 square miles in extent and only a short distance from Umaria. The Katni-Bilaspur Railway passes along its western margin. *KORAR*, three miles north of Umaria, is a field of good coal of nine square miles in extent, and *BISRAMPUR*,—a coal field in the central basin of Sarguja—covers an area of 400 square miles of good coal suitable for locomotive purposes.

Coal has recently been discovered in Palana, a small village in Bikanir territory within the jurisdiction of the Saddar Tehsil.

Nizam's Dominions.

51. *NIZAM'S DOMINIONS AND MADRAS*—The lower Godavari coal fields.

The most important mine in Southern India is the *SINGARENI* in the Nizam's Dominions. The output from that mine was last year 365,550 tons, being an increase of 39·15 per cent. on the returns of the previous year and 37·74 per cent. on the average of the three previous years. The mining capabilities of the collieries have been of late considerably increased, and a successful effort has been made to settle labour on the field. The immediate result of this expansion of production has been the steady growth of a by no means inconsiderable export to Madras and Bombay with a smaller amount to the Central Provinces. In 1892-93, this stood at 77,967 tons and in 1896-97 at 217,174 tons; of the latter figure 6,418 tons went to the Central Provinces. The respective shares taken by Bombay and by Madras of these rail-borne exports were: Bombay 119,890 tons and Madras 90,276 tons. (*See pages 82, 83.*) The increasing importance of the Singareni mine is in fact one of the most significant features of the present Indian trade in coal. And with the completion of the East Coast Railway it will doubtless become even still more important. The sales during the year 1897 of the produce of the mine are detailed below—

	Tons.
Great Indian Peninsula Railway	97,936
East Coast State Railway	24,768
Madras Railway	40,000
Southern Mahratta Railway	45,923
South Indian Railway	7,577
Bombay, Baroda and Central India Railway	37,372
H. H. the Nizam's State Railway	31,105
Bombay Mills	54,821
Other customers	8,170
TOTAL	347,672

Madras.

KAMARUM, CHERIA, CHINNUR, MADAVARAM and *BEDDADANOL* are coal fields that may be described as unexplored. Beddadanol is the most southern manifestation of coal in India. It covers an area of 5¼ square miles, but contains worthless coal: *KAMARUM* is a field of good coal estimated equal to 1,132,560 tons. Its position in relation to present trade routes is somewhat unfavourable.

The Madras mines of this area are the *RAJAHZOMPALLI*. These mines can hardly, however, be regarded as fully established. The output of 1895 expanded by 29·92 per cent. on the former year and 174·41 per cent. on the average of the three previous years. Recent discoveries would, however, seem to support the inference that most of the Godavari mines have a future of such promise especially in relation to the East Coast Railway, to a possible future iron smelting industry, and to the port of Vizagapatam.

Panjab

52. *PANJAB.*—Passing from the south to almost the extreme north-north-west of India another group of coal deposits is met with in the Panjab. On the Salt Range nummulitic coal occurs at several localities such as Amb, Sunglewar, Chamil, Kutta Karuli, etc., but only in small quantities. The *DANDOT* colliery in the Jhelam district possesses a more promising supply than either of the other localities just mentioned. The coal occurs at an elevation of 2,000 feet above sea-level in the Salt Range, but its thickest seam is only about 2 feet 6 inches. The output from this mine has, notwithstanding the friable and pyritous condition of the coal, expanded considerably. The production of Panjab coal in 1897 came to 92,792 tons, or an expansion of 17·43 per cent. on the return of 1896 and of 27·70 per cent. on the average of the three previous years. This result is due to labour coming in more freely, owing to the scarcity of food grains and high prices prevailing. The colliery is capable of a much larger output than is now obtained from it, but it is hampered for the want of labour. The working of the mines during the year showed a profit of R95,265, equivalent to a return of 19·87 per cent. on the capital outlay. The coal is consumed (as also that of the Baluchistan mines) by the North Western Railway. At *PIND* there is a seam three feet in thickness and at the *BHAGANWALLA* colliery a seam even thicker than that at Pind. Both of these mines, however, are worked at a net loss. At *CHITAPAHAR, HAZARA*, and *ABNNU* there are other coal fields as yet not fully explored. It may be doubted, however, whether the future will witness any material expansion of the smaller Panjab mines.

Baluchistan.

53. *BALUCHISTAN.*—The chief places in Baluchistan whence coal is obtained are Khost and Mach in the Bolan Pass. Baluchistan coal generally possesses good steam-producing qualities, but being of a very friable nature is liable to crumble to dust if left exposed to the air for any length of time. It is chiefly used in the form of patent fuel, which commands a fairly large sale in the Quetta district. This sale, however, is comparatively so small that the machines for converting the coal dust into fuel have to be kept closed the greater part of the year. There would doubtless be a great demand for this fuel at Karachi, where it would be very useful for shipping purposes, but the present grantee of the Mach mines states that the rates charged by the North Western Railway prohibit the export of coal either to Karachi or elsewhere.

COAL: POSITION and PROSPECTS. INDIAN SUPPLY.

If by any means these rates could be lowered, there is reason to believe that the coal industry in Baluchistan would have a great future, and would add considerably to the revenue of the district.

Below are given particulars of the principal mines now being worked :—

Baluchistan.

KHOST.—These mines are situated near the Khost Station of the Sind-Pishin Section of the North Western Railway, and are worked by the Railway to provide fuel for their locomotives.

The coal is found in seams varying from 6 inches to 2½ feet in thickness, lying at an angle of about 60°, and is obtained by excavating adits horizontally from the face of the hill till the seams to be worked are met. From the opening of these mines up to the 31st December 1897, 73,400 tons of steam coal, 3,541 tons of "nut" coal, and 43,580 tons of coal dust have been procured; the output for the past year having been 5,151¼, 661¼ and 2,976¾ tons, respectively. The quality generally is excellent, and the steam and "nut" coal is used almost exclusively in the locomotives working above Sibi, below which station it cannot compete in economy of working with wood fuel. The best quality of the dust is used in the manufacture of patent fuel at Quetta for use in the locomotives, and most of the remainder is used by the Railway, or for brick-burning.

MACH.—The output at these mines during the last year was about 3,000 tons. More coal than this could have been produced, but the local demand was not sufficient to keep the mines constantly working. The coal is mostly made into patent fuel, as in this form it commands the best sale.

Besides the above mines, coal is produced at the following places :—

	Output during 1897.
Sharigh	88 tons.
Les in the Bolan District	358 ,,
Hill range in the Quetta district	291 ,,

(*From information supplied by the Agent to the Governor General.*)

Assam.

54. *ASSAM.*—Cretaceous and nummulitic coal occurs at many isolated places throughout this province as, for example, in the Dufla Hills (a seam, by the bye, of Gondwana coal); in the Khasi and Jaintia Hills (Cherrapunji); in the Garo Hills (Darangiri); in the Lakhimpur district (Makum mines) and in the Naga Hills adjoining Sibsagar. The Assam coal is generally small and soft, but its softness is not a drawback to its general use. It has a very small percentage of ash and gives a very clear bright flame with great heat. The Lakhimpur mines are situated in the neighbourhood of Margarita, and the wages of the coolies vary from ₹7 to ₹16 for men and ₹6 to ₹8 for women. Boys get ₹5. There were seven collieries at work during 1897, *viz.*, five in the Lakhimpur district and two in the Naga Hills. The average number of work people employed on the Lakhimpur and Naga Hills mines were 1,706 and 61, respectively. A noteworthy feature of these mines is that the borings are not vertical, but are made horizontally into the hillside. Coal is also extracted by the Khasias in the Khasi and Jaintia Hills, but excavations are small and the quantity taken out is barely sufficient to meet local requirements. With the opening up of railway communication it seems highly probable that several of the areas of supply will be very greatly developed.

The *MAKUM* mines are those alone that are being systematically worked at present. The field contains several seams, one of which is over 100 feet thick, 75 feet of which is good coal. The output last year from seven collieries came to 185,533 tons, being an expansion of 8,274 tons (4·66 per cent.) on the production of the previous year and of 12,392 tons on the average of the three previous years. It has been estimated that there may be 18,000,000 tons of coal. The trans-Dekho Naga mines are worked by the Assam Tea Company, the output of which in 1895 came to 92 tons. The Nazira and Jaipur Naga Hills supply has been calculated to come to 20,000,000 tons.

Burma.

55. *BURMA.*—The chief feature in the coal mining industry of this province is the fall from 22,993 tons in 1896 to 11,472 tons, or a reduction of almost exactly fifty per cent. on the year's outturn. The decrease was chiefly due to flooding of the mines at Letkokpin. The chief fields are the *THINGADAW* coal fields (Letkokpin mines, Shwebo district) on the west bank of the Irrawadi; there are three localities with seams of about four to five feet in thickness, consisting for the most part of good, hard, compact coal which often contains imbedded lumps of amber-like resin. The operations of prospecting and opening out a new mine at Kyetsobin have been carried on during the year. On the *CHINDWIN* river near Kalewa a 10-foot seam of good cretaceous coal occurs. In Arakan, Pegu (Thayetmyo mines) and Tenasserim (Mergui) coal is met with and to a small extent has been worked.

About one-quarter to one-third of the coal raised from the Letkokpin colliery, worked by the Burma Coal Company, consists of dust which is looked upon as refuse. Experiments are now being made to utilise this dust for briquette manufacture. A briquette machine has been erected and the compressed coal has proved thoroughly satisfactory in the locomotives and boilers of the company.

IX.—INTERNAL TRADE IN COAL.

TRADE. PROVINCIAL:

56. This section will deal with the distribution of the supplies mentioned in the foregoing remarks. The table given at page 14 shows the total imports of foreign coal to have been last year 481,036 tons; of that amount Bombay took 362,223 tons, Madras 69,637 tons, Burma 28,028 tons, Sind 15,328 tons, and Bengal 5,820 tons. These quantities were of course received by the port towns, and either used up there or portions distributed by rail and river or re-exported coastwise. Since the returns of the internal trade make no distinction as to whether the coal referred to is foreign or Indian, it is impossible to exhibit the ultimate distribution of the foreign supply further than has been given. The remarks that follow must, therefore, be understood as referring to both foreign and Indian collectively. Of course it is practically in he case of Bombay only that any ambiguity exists.

The following statement of the Imports and Exports, coastwise, of Indian coal may be given for the past five years:—

Imports and Exports of Indian Coal Coastwise.

		1892-93. Tons.	1893-94. Tons.	1894-95. Tons.	1895-96. Tons.	1896-97. Tons.
Bengal	Imports into	492	3,044	5,951	8,131	6,039
	Exports from	195,760	246,456	189,619	351,025	544,582
Bombay	Imports into	50,330	73,015	58,421	121,602	259,027
	Exports from	11	...	173	10	7,090
Sind	Imports into	...	3,700	...	4,188	13,689
	Exports from	...	...	...	...	...
Madras	Imports into	48,479	37,496	44,788	27,825	131,785
	Exports from	519	68	120	165	93
Burma	Imports into	92,807	94,501	72,049	123,152	74,736
	Exports from	5	10	116	736	343
TOTAL	Imports	192,108	211,756	181,209	284,898	485,276
	Exports	196,295	246,534	190,028	351,936	552,108

The facts of most interest brought out by these tables will be seen at a glance. Bengal is the exporting province, and the statistics of the past five years show a rapidly increasing demand. The trade in Bombay has become most active; the imports which have been steadily increasing have suddenly doubled, and the exports previously nominal have reached 7,000 tons. The Madras imports are five times those of 1896, and consist of Bengal coal supplied for the use of railways and engineering works.

57. ***Rail and River Traffic.***—The amounts of coal carried by the railways during 1896-97 will be found in the Appendix (*pages 82, 83*), but it may serve a useful purpose to give an abstract of the imports and exports from the chief centres during the five years 1892–97. The returns so tabulated may then be compared with the coastwise trade above and with the foreign imports (*page 14*), in order that the total imports or the total exports may be discovered, for each centre, during any one of the years in question. It may be here explained that the chief port towns (Calcutta, Bombay, Karachi and the Madras ports) are treated as if they were provinces, so that the trade of these large towns can be discovered apart from that of the provinces in which they are placed. The coal that passed over the East Indian Railway during 1894 came to 2,325,000 tons; during the past year (1897) that railway carried 3,349,269 tons; the Bengal-Nagpur 793,824 tons; the Eastern Bengal 161,016 tons; the Great Indian Peninsula 197,351 tons, and H. H. the Nizam's Guaranteed Railway 317,189 tons. The total amount carried by all Indian Railways last year came to 5,382,634 tons.

The excess in that figure over the returns shown in the table (*pages 82-83*) is due to the same coal having passed over two or more railways or different directions, and been thus returned twice.

Imports and Exports of Coal, carried by Rail and River, during 1892–97.

Conf. with detailed statement, pages 82, 83.

		1892-93.	1893-94.	1894-95.	1895-96.	1896-97.
British Provinces (*Excluding Seaports*).		Tons.	Tons.	Tons.	Tons.	Tons.
Bengal	Imports into	66,500	78,806	97,205	90,374	98,237
	Exports from	1,317,584	1,202,486	1,416,944	1,900,045	1,821,621
Bombay	Imports into	199,118	181,878	221,557	250,979	228,156
	Exports from	42,652	21,949	41,928	29,223	18,085
Sind	Imports into	6,357	4,769	7,075	10,789	7,556
	Exports from	792	40	15	81	170
Madras	Imports into	58,220	73,072	157,998	162,791	129,905
	Exports from	1,902	4,247	5,413	18,384	12,320

COAL: TRADE. PROVINCIAL:

Rail and River Traffic.

Imports and Exports of Coal, carried by Rail and River, during 1892–97—(contd.)

		1892-93.	1893-94.	1894-95.	1895-96.	1896-97.
British Provinces (*Excluding Seaports*)—contd.		Tons.	Tons.	Tons.	Tons.	Tons.
N.-W. P. and Oudh	Imports into	327,700	348,662	391,161	485,503	371,167
	Exports from	83,439	64,741	107,289	140,539	93,371
Panjab	Imports into	53,617	56,323	100,444	123,312	70,062
	Exports from	126	42	358	58	383
Central Provinces	Imports into	85,972	88,656	73,300	76,259	87,652
	Exports from	64,894	82,662	67,408	74,175	78,356
Berar	Imports into	27,529	37,184	31,454	27,589	23,324
	Exports from	627	1,841	571	247	153
Assam	Imports into	8,428	8,485	3,561	3,929	4,342
	Exports from	75,277	64,721	69,333	70,342	69,009
Total of Provinces	Imports	833,441	877,835	1,083,755	1,231,525	1,020,401
	Exports	1,587,293	1,442,729	1,709,259	2,233,094	2,093,468
Native States.						
Rajputana and Central India.	Imports into	81,230	39,848	73,707	77,011	73,750
	Exports from	75,363	97,544	98,219	100,639	89,600
Nizam's Dominions	Imports into	67	289	88	89	98
	Exports from	77,967	100,455	201,076	205,584	217,174
Mysore	Imports into	56,935	68,245	81,621	97,289	106,219
	Exports from	2	13	817	224	75
Total of States	Imports	138,232	108,382	155,416	174,389	182,067
	Exports	153,332	198,012	300,112	306,447	306,849
Chief Seaports.						
Calcutta	Imports into	998,883	854,709	1,013,084	1,406,611	1,444,483
	Exports from	35,378	41,918	43,034	37,006	49,960
Bombay	Imports into	8,096	12,677	10,761	17,342	53,500
	Exports from	120,781	84,411	103,603	139,186	106,239
Karachi	Imports into	791	12	...	69	58
	Exports from	6,967	5,403	7,425	13,158	7,792
Madras Ports	Imports into	980	1,367	3,726	15,278	32,710
	Exports from	76,672	82,509	103,309	116,323	148,911
Total of Seaports	Imports	1,008,750	868,765	1,027,571	1,439,300	1,510,751
	Exports	239,798	214,241	257,371	305,673	312,902
Grand Total	Imports	1,980,423	1,854,982	2,266,742	2,845,214	2,713,219
	Exports	1,980,423	1,854,982	2,266,742	2,845,214	2,713,219

58. A glance at the figures given in the table above, of the rail and river-borne IMPORTS OF COAL during past five years, will suffice to convey the impression that there are three very important directions in this trade. These are *in order of magnitude*: the exports from Bengal; the imports of Calcutta; the imports of the North-West Provinces and Oudh; and the imports of the Presidency of Bombay. But it will also be readily perceived that there are two features of the import traffic that owe their interest to their *comparative insignificance, viz.*, the rail-borne imports of Assam and of the sea-ports of Madras. Lastly,

there are four items that are distinctly of value because of their each indicating a steadily *expanding demand* for coal, *viz.*, the imports of the Province of Bengal; the imports of the Central Provinces; the imports of Rajputana; and the imports of Mysore.

It will be instructive to analyse very briefly these specially interesting aspects of the rail-borne coal imports.

59. (*a*) Calcutta received by rail 998,883 tons of coal in 1892-93 and 1,444,483 tons in 1896-97 (*Conf. table, previous page*). This is an expansion of 44·60 per cent. during the years named. A correspondingly instructive feature is the expansion of the Coastwise Exports of Indian Coal. These in 1892-93 stood at 195,760 tons and last year at 544,582 tons or an expansion of 178·18 per cent. Her rail-borne exports have averaged, say, 40,000 tons mainly to Eastern Bengal and Assam. It may be useful to give here a balance sheet of the Calcutta coal trade for the past five years showing the net supply to the city and its immediate neighbourhood.

Coal Supply of Calcutta.

Analysis of the Coal, Coke and Patent Fuel Trade of Calcutta (Bengal).

	Imports.				Exports.				Net Supply of Calcutta.
	1 (Page 14 Excluding Coke.) (Coal and Coke).	2 Page 19.	3 Page 20.	4	5	6	7	8	9
		Coastwise.	Rail.	Total Imports.	Foreign.	Coastwise.	Rail.	Total Exports.	Deduct total Exports (column 8) from total Imports (column 4).
	Tons.	Tons.	Tons	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1892-93 . .	12,831	492	998,883	1,012,206	15,725	195,760	35,378	246,863	765,343
1893-94 . .	8,113	3,044	854,709	865,866	51,225	246,456	41,918	339,599	526,267
1894-95 . .	9,138	5,951	1,013,084	1,028,173	53,665	189,619	43,034	286,318	741,855
1895-96 . .	9,280	8,131	1,406,611	1,424,022	80,169	351,025	37,006	468,200	955,822
1896-97 . .	8,876	6,039	1,444,483	1,459,398	133,999	544,582	49,960	728,541	730,857

The figures shown in column 9 may be regarded as representing the annual consumption since the surplus stock may be assumed to be on the whole a constant quantity. The figures for the past five years show a decrease of the Calcutta demand that comes to 4·5 per cent. This no doubt was due not to diminished production, but to the absence of sufficient rolling-stock on the railways to convey the coal from the mines to the sea board.

N.-W. P. Increasing consumption.

60. (*b*) The North-West Provinces and Oudh received 327,700 tons of coal by rail during 1892-93 and 371,167 tons in 1896-97 or an expansion that comes to 13·26 per cent. By consulting the details of that traffic (*pages 82, 83*) it is discovered that in 1892-93 Bengal Province furnished 297,950 tons or 90·92 per cent., and in 1896-97, 331,236 tons or 89·24 per cent. of the total supply to these provinces. Then again we learn still further that the North-West Provinces derived their next largest contribution from Central India. In 1892-93 they imported from Central India 29,605 tons or 9·03 per cent. of the total imports, and in 1896-97, 39,814 tons, being 10·72 per cent. on the supply of that year. But turning attention for the moment to the exports of coal by rail from these provinces, we learn that these were 83,439 tons in 1892-93 and had increased to 933,71 tons in 1896-97, or an expansion of 11·90 per cent. These exports have accordingly to be deducted from the returns shown in the table of imports in order to arrive at the net supply, what, by ignoring a constant surplus stock of slightly variable quantity, may be called the annual consumption. During the years in question the net supply was 244,261 tons in 1892-93; 283,921 tons in 1893-94; 283,872 tons in 1894,95; 344,964 tons in 1895-96, and 277,796 tons in 1896-97. Thus the consumption of these provinces has manifested a decline during the past year. The exports go mainly to the Panjab, the balance to Rajputana and the Central Provinces.

Bombay Presidency.

61. (*c*) Bombay Presidency rail-borne imports of coal are very significant. While manifesting occasional fluctuations they have shown a tendency to improve. They were, as will be seen from the table (*page 19*), 199,118 tons in 1892-93 and 228,156 tons in 1896-97. But it may be interesting to examine with more detail these imports, especially with relation to the sources of supply. During the year 1892-93, 116,501 tons were drawn from the port town (presumably foreign coal), 39,423 tons derived from H. H the Nizam's Dominions (Singareni coal), and 39,890 tons derived from the Central Provinces (Warora and probably also Mohpani coal). Last year the corresponding figures were: foreign coal 103,024 tons (11·56 per cent. decrease); Singareni 76,608 tons (94·32 per cnt. increase), and 44,418 tons Warora and Mohpani (11·35 per cent. increase). At the same time, the exports have similarly fluctuated, but made no material change. The average for the past five years comes to 30,767 tons, and last year's actual exports stood at 18,085 tons.

COAL : TRADE. PROVINCIAL :

It will thus be seen that the character of the Bombay Presidency supply has been considerably changed within recent years. The production at the Indian mines is distinctly checking the trade in imported coal thereby releasing larger quantities of that coal to meet the growing demands of the town of Bombay itself.

62. (*d*) But turning now to the Bombay port town rail-borne transactions, the total imports in 1892-93 were 8,096 tons, and of that amount 7,932 tons were drawn from the Presidency, 102 tons from the Nizam's Dominions, and 40 tons from Berar. The corresponding figures for 1896-97 were total rail imports by port town of Bombay 53,500 tons, of which 10,035 tons were derived from the Presidency, 43,282 tons from Nizam's Dominions, 166 tons from the Central Provinces and none from Berar.

By way of concluding this statement of the Bombay traffic in coal it may be desirable to show the net supply of the town of Bombay by way of comparison with that given above for Calcutta. This will be derived by deducting the total of all exports (by sea and by rail) from the total of all imports consigned to the town of Bombay.

Coal Supply of Bombay.

Analysis of the Coal, Coke and Patent Fuel Trade of the Town of Bombay.

	Imports.				Exports.				Net Supply of Bombay.
	1 (Page 14 Excluding Coke.)	2 Page 19.	3 Page 20.	4	5	6	7	8	9
	Foreign (Coal and Coke). Tons.	Coastwise. Tons.	Rail. Tons.	Total Imports. Tons.	Foreign. Tons.	Coastwise. Tons.	Rail. Tons.	Total Exports. Tons.	Deduct total Exports (column 8) from total Imports (column 4). Tons.
1892-93 . .	504,083	50,330	8,096	562,509	*Nil*	11	120,781	120,792	441,717
1893-94 . .	427,805	73,015	12,677	513,497	2	*Nil*	84,411	84,413	429,084
1894-95 .	653,729	58,421	10,761	722,911	*Nil*	173	103,603	103,776	619,135
1895-96 . .	565,631	121,602	17,342	704,575	650	10	139,186	139,846	564,729
1896-97 . .	369,137	259,027	53,500	681,664	2,720	7,090	106,239	116,049	565,615

It will thus be seen that the consumption of the town of Bombay for the shipping, mills, factories, railways, etc., has manifested extreme fluctuations, but may, on the whole, be regarded as improving, the expansion since 1892-93 being 28·04 per cent. The improvement has been chiefly in the increasing sea-borne imports of Bengal coal with a slight increase in the supplies drawn by land routes from the Singareni mines and not in any improvement in the foreign imports. A noticeable feature of the above analysis of the traffic with the town of Bombay is the fluctuating decline in the rail-borne exports. This, as already remarked, may be taken as the direct result of the increased Indian production, penetrating to the mills and railways of the Presidency in such quantity as to tell on the demands for English coal.

Comparing year by year the net consumption of Bombay town for the past five years, with the corresponding figures for Calcutta, it will be seen that the latter took in 1892-93, 323,626, and in 1896-97, 165,242 tons more than the Western capital. This to some extent is doubtless due to the extensive steamer traffic on the rivers of Bengal and Assam.

Madras Ports.

63. (*e*) Sea-port towns of Madras Presidency are remarkable because of the small amounts of coal carried to them by the railways. This is doubtless due to their distance from the mines, but the fact is none the less significant. In 1892-93 the total rail-borne imports into these ports came to 980 tons and in 1896-97 it had expanded to 12,710 tons (*see table, page 19*). An important feature of the modern returns is the growth of the supply drawn from the Singareni mines which to a great extent must account for the very remarkable increase this year. In 1892-93 this came to 23 tons and in 1896-97 to 3,843 tons. (*See pages 82, 83.*) The exports from the sea-port towns of Madras, it must be remarked, are consigned for the most part to the Kolar Gold Fields in Mysore.

Bengal Province.

64. (*f*) The rail-borne imports of coal by the Province of Bengal have expanded from 66,500 tons in 1892-93 to 98,237 tons in 1896-97, the latter showing a slight increase, however, on the figures of the preceding year. The items of that supply last year were: Assam 49,317 tons and Calcutta 45,755 tons. The latter goes to the Railways of Eastern Bengal *viâ* Calcutta.

Madras Presidency.

65. (*g*) The rail-borne coal traffic of the Presidency of Madras has similarly manifested a considerable expansion. It stood at 58,220 tons in 1892-93 and had expanded to 129,905 tons in 1896-97 or an expansion of 123·12 per cent. The imports of the former year were 38,419 tons from the Nizam's Dominions and 19,798 from the seaports. Of the latter year they were 86,433 tons from the Nizam's Dominions, and 43,369 tons from the port towns with small amounts from Mysore, Bengal and Bombay. In the Presidency Singareni coal is thus rapidly displacing foreign coal, the expansion of the supply having been

124·96 per cent. during the past five years. As against these figures, the exports from the Presidency may be characterised as nominal.

(*h*) The expansion of the Panjab supply by railway similarly manifests the drain that year by year is becoming heavier and more direct on the Indian production. In 1892-93 the Panjab imported 53,617 tons and in 1896-97, 70,062 tons, or an expansion of 30·67 per cent. In the former year the supply was derived as follows:—44,281 tons from the North-West Provinces; 8,525 tons from Bengal and 611 tons from Karachi (foreign coal). Last year the chief items of the supply were 46,933 tons from the North-West Provinces; 22,480 tons from Bengal; 20 tons from Bombay; 187 tons from Central India (Umaria coal); and 296 tons from Karachi.

Central Provinces.

66. (*i*) In the Central Provinces the imports were in 1892-93, 85,972 tons, and in 1896-97, 87,652 tons; these quantities show a remarkable uniformity. The exports also considerably resembled the imports so that the Bengal mines and the Umaria mines may be supposed to have furnished coal to the districts in their neighbourhood, while the coal mines of Chanda and Narsinghpur restored the balance of the provincial requirements by their exports to other provinces.

Assam.

67. (*j*) Assam, from the table (*page 20*), will be seen to be distinctly an exporting province. In 1892-93 it exported by rail and river 75,277 tons and in 1896-97, 69,009 tons. The year 1891-92 showed the highest record. The imports, as already remarked, are drawn from Calcutta.

Rajputana.

68. (*k*) The rail-borne imports, shown in the statement against Rajputana and Central India, are approximately the supplies drawn by Rajputana. Central India with its Umaria mines is an exporting province.

The subject of the Umaria mines has been so often alluded to already that it may be dismissed with the remark that the rail-borne trade of the past five years shows an expansion of 18·89 per cent.

Nizam's Dominions.

69. (*l*) The Nizam's Dominions rail-borne traffic may, like that of Central India, be dismissed with a few words. Repeated reference has been made to the rapidity with which the Singareni coal is finding its way over Madras and Bombay. The exports show an expansion of 178·54 per cent. during the past five years.

It may thus be admitted that the returns of the Rail and River-borne Traffic abundantly support the statement that Indian production is displacing imported coal. The growing demand demonstrates the rapid advancements that are being made in railway extension and the rise of a manufacturing enterprise that will sooner or later be felt in all the markets of the world.

X.—FOREIGN TRADE IN COAL.

Exports of Indian Coal to Foreign Countries.

70. By way of concluding this account of the coal production and trade of India it is desirable to give some further particulars of the Foreign Trade, *viz.*, to the countries to which Indian coal is exported and the foreign countries from which India's imports are derived.

Bengal Coal Exported to Foreign Countries.

Table showing the Exports of Bengal Coal to Foreign Countries, exclusive of Coke and Patent Fuel.

Year.	To Ceylon.		To Straits Settlements.		To Mauritius and the West Indies.		To Aden, Arabia and Africa.		To other Countries.		Total.	
	Tons.	₹	Tons.	₹	Tons.	₹	Tons.	₹	Tons.	₹	Tons.	₹
1892-93 . .	13,379	1,36,230	3	150	1,518	13,358	*Nil*	*Nil*	720	7,050	15,620	1,55,788
1893-94 . .	28,044	2,60,801	14,792	1,53,860	3,638	32,504	5,720	57,200	7	110	52,201	5,04,475
1894-95 . .	47,820	4,42,901	5,277	52,845	*Nil*	*Nil*	368	3,680	100	800	53,565	5,00,226
1895-96 . .	48,882	5,15,697	26,344	2,55,340	4,760	77,500	*Nil*	*Nil*	3	42	79,989	8,48,579
1896-97 . .	93,385	9,69,507	14,531	1,39,370	7,757	75,570	16,775	1,77,430	1,300	8,450	133,748	13,70,327

It will be observed that the foreign exports are mainly to Ceylon. Coal goes to Colombo to meet the demands of the steamer traffic with India and the East generally. It is not consumed locally to any appreciable extent. But the supply thus met by Bengal used formerly to be drawn from Europe, so that the increasing shipments are a direct indication of the competition of the Indian with the European coal. The supply to the Straits Settlements is not very important and might be treated as a set-off against the very inferior coal that Japan supplies to Bombay.

71. The table given on page 14 will be found to manifest the amounts of coal drawn by the various provinces of India from foreign countries. It is desirable to give here the other view of that traffic, namely, the countries from which these imports are derived.

COAL: TRADE. IMPERIAL.

Table to show the Chief Foreign Countries from which India obtains Coal, Coke and Patent Fuel—Excluding Government Stores, which see page 25.

Foreign Countries whence obtained.

Conf. with page 14 Receiving Provinces.

Countries.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.
	Tons.	Tons.	Tons.	Tons.	Tons.
United Kingdom	627,032	531,043	775,017	734,336	397,092
Belgium	130	...	2,271	200	550
Germany	300	132	2,255	60	1,101
Cape Colony	180	47	245	115	3
Egypt	...	10	...	96	...
South America	1,087	103	1,194	38	...
Aden	143	193	...	70	110
Ceylon	56	369	4,424	149	100
Japan	1,900	11,331	8,531	10,588	56,882
Australia	16,942	11,155	27,767	15,349	36,346
Other Countries	415	897	1,610	995	2,776
Total	648,185	555,280	823,314	761,996	494,960

The supply furnished by the United Kingdom (exclusive of Government Stores) which averages about 96 per cent. of the total, may be said to have shown indications of decline. This may be borne out by giving the figures for the five years previous to 1890-91 as follows:—From the United Kingdom in the year 1885-86, 746,554 tons; 1886-87, 730,813 tons; 1887-88, 810,489 tons; 1888-89, 813,821 tons, and in 1889-90, 552,071 tons. Fluctuations have thus taken place, but the average of the first half of the past decade (1885-1896) was distinctly higher than the average of the second half.

The table above would show the supply drawn from Australia to be improving, but if observation be carried further back, this is revealed as a false inference: thus imports by India from Australia, 1885-86, 38,261 tons; 1886-87, 30,640 tons; 1887-88, 35,065 tons; 1888-89, 17,290 tons; and 1890-91, 45,320 tons. The second half of the past decade has thus marked a very considerable contraction in the Australian supply. But the trade from Japan to India (which goes to Bombay) manifests, on the other hand, a very considerable expansion. The first consignment was received in 1887-88, *viz.*, 1,550 tons, since which time it has shown many fluctuations, but a general upward tendency.

COKE.

XI.—COKE AND PATENT FUEL.

72. In the above table coke and patent fuel have been combined with the returns of coal. The table, page 14, shows coal by itself and also the grand total, including coke, patent fuel and Government stores (*e.g.*, imports of coal, coke, etc., on behalf of Government). It may, perhaps, be instructive as showing to what extent the Indian mines have contested the demand for coke and patent fuel to give here the returns of foreign imports for the past ten years. It may be remarked that up to the year 1893-94 the whole of the coke and patent fuel was obtained from the United Kingdom. In the year mentioned, however, South America furnished the quantity of patent fuel shown, and in 1894-95 Germany contributed 426 tons of coke, and Belgium 1,675 tons of patent fuel. In 1895-96 Great Britain supplied 14,231 tons of coke, the balance on total imports came from Germany and Australia, and the patent fuel in 1896 came from Belgium and Madagascar. Last year Germany contributed only 2 tons on the total imports of coke, and the whole of the balance was obtained from the United Kingdom. The quantity of patent fuel was last year supplied by Belgium alone.

Years.	Coke in tons.	Patent Fuel in tons.
1887-88	10,554	38,164
1888-89	11,732	11,281
1889-90	9,765	19,114
1890-91	9,339	7,393
1891-92	12,766	10
1892-93	12,536	900
1893-94	11,257	17
1894-95	12,425	2,175
1895-96	14,396	750
1896-97	13,374	550

XII.—GOVERNMENT STORES IN COAL, COKE AND PATENT FUEL.

COAL: TRADE.

GOVERNMENT STORES.

73. The demands of Government for foreign coal, coke, etc., are not very extensive and may be said to have been steadily declining for some years past:—

YEARS.	Coal in tons.	Coke in tons.	Patent Fuel in tons.	TOTAL in tons.
1892-93 . .	47,248	3,893	4,015	55,156
1893-94 . .	32,639	2,084	1,004	35,727
1894-95 . .	23,753	1,300	...	25,053
1895-96 . .	21,450	3,618	50	25,118
1896-97 . .	23,726	693	...	24,419

These Government imports are almost entirely consigned to Bombay with small quantities to Bengal and Burma.

III.—IRON ORES (*Lohá*, HIND.)

IRON:

XIII.—OCCURRENCE OF IRON ORES.

74. Iron ores exist all over India, especially in Madras (as, for example, in the Salem, Bellary, and Kurnool districts); in the Central Provinces (about Warora and Jabalpur); in the hilly districts of Western Bengal; and in Ranawao and Rampur in Kathiawar. In Bengal alone, however, where coal can be had in close proximity to the ore, is smelting carried on after European methods.

OCCURRENCE.

XIV.—PRODUCTION OF IRON.

PRODUCTION.

75. During 1897 the total production of iron in India (see Statement I, *page 74*) was 43,314 tons. If compared with the previous year, that figure shows a considerable increase in outturn of 214·41 per cent. and of 32·29 per cent. on the average of the three previous years.

There is, however, reason to believe that very little, if any, reliance can be put on these figures. It is even possible that some of the returns refer to iron ore, and others to more or less crude manufactured iron, and it is not easy to discover the relation that exists between the ore and the metal. From the composition of various Indian iron ores from the tables of results prepared at the Imperial Institute and published in this Review for 1895, it was seen that the proportion of available iron varied between 31·92 and 70·06 per cent. In the ordinary processes of manufacture the actual percentages shown by the analyses are never reached. In reducing the ore to crude, cast or pig iron by smelting, the metal generally equals half the weight of the ore. Then the further operation of "puddling" brings about a reduction of three-quarters or two-thirds of the pig iron, which is converted into pure or fine metal. It may, therefore, be safely assumed that, however rich the ore, the proportion of finished metal derived from it can scarcely exceed 30 per cent. Hence the difficulty in the statements concerning Indian production of iron being drawn up with any great accuracy. The trade returns showing the weight and value of iron this year are differentiated as "cast," "unwrought," "wrought," "manufactured," and "Total Iron and Steel" (see Statements, pp. 86-105).

BENGAL.

76. ***BENGAL.***—The production of this province has been given as 36,280 tons, valued at ₹65,696, a valuation that would show the crude ore as costing R1-12-11 a ton. As compared with the returns of 1896, production for the year under review would manifest an increase of 492·81 per cent., or on the average of the three previous years of 72·53 per cent. The Barakar Iron Works may almost be spoken of as the only source of locally produced iron in the province. The actual figures furnished by the Government of Bengal are Hazaribagh 406 tons, with in addition 370 tons of black iron slag stone in Dacca valued at ₹200, and 320 tons of iron slag in Monghyr. The last two amounts have not been included in Statement No. I (*page 74*) as iron ore.

DACCA.

The Collector of Dacca reports that the block iron slag stones are found in different parts of Bhowal, but nothing is known about their origin. They lie in heaps on the surface of the earth, and are used in metalling roads. No regular work or establishment exists in connection with this industry, formerly large quantities were taken by contractors under the Municipalities of Dacca and Naraingunge. They engaged boats to carry them, and the boat-men loaded the boats from the heaps. At present the stores are not procurable near the canals or railway lines, and the industry is therefore declining.

Iron articles manufactured.

In the Barakar Factory in Burdwan pig-iron pipes and various kinds of castings are turned out. In Howrah there are four iron works. Cutlery and other iron articles are made at Kaligunj in Khulna district, at Kanchannagar near Burdwan, and at Jhalda in Manbhum district. The sword-tucks of Jhalda have a local reputation, and an inferior kind of fowling-piece is made at the same place as also at Jheria and Kalia in the same district. Guns and pistols are manufactured in Monghyr. The number of guns and pistols exported from Monghyr last year was 2,236, of which 891 found their way from Calcutta.

BURDWAN.

No figures are forthcoming from the Commissioner regarding the production of iron ores in the Burdwan Division, but it is reported by the Commissioner of Burdwan that 35,870 tons of iron ores were purchased by

IRON : PRODUCTION. BENGAL.

the Bengal Steel and Iron Works at a total cost of R61 954. The Commissioner of Bhagalpur returned 3·7 tons as the production of iron ores valued at R125. Evidently the quantity is for the finished metal.

In the *Financial and Commercial Statistics of British India*, Fifth issue, the Barakar Iron Works are shown to have given employment during 1896 to 426 persons and to have produced 5,213 tons of pig iron valued at R3,59,729. If it be accepted that it takes 2½ tons of iron ore to yield one ton of pig iron or 40 per cent., the consumption of ore at the Barakar Works must have been 13,082 tons or, say, 23,200 tons less than the total recorded production of ore for the entire province, and worked out from the data furnished their pig iron cost R68-11-10 per ton. The rail-borne returns in the Appendix (*page 103*) will be seen to manifest an export from Bengal of 6,601 (from 1st October 1896 to 31st March 1897) tons of iron, of which nearly the whole was consigned to Calcutta.

PANJAB.

77. ***PANJAB.***—The product of the Mandi Iron Works is calculated to yield an income of R3,000 per annum. The mines are of a most primitive condition, and it is reasonable to expect that with the introduction of modern appliances the output might be considerably increased. Anthracite is also said to exist near Mandi and can be gathered almost on the surface of the land. The iron is disposed of annually at the *Pipli Jalir* or iron fair held in Kulu in May. At the fair held this year, 1898, over R2,000 worth of locally manufactured iron from native ore was sold.

The Kohr Iron mine at Kohr *vid* Baijnath is the property of Government. The lease is sold by public auction annually and fetches about R50.

CENTRAL PROVINCES.

78. ***CENTRAL PROVINCES.***—Iron ore is chiefly obtained in Chanda, Narsinghpur, Bhandara, Raipur and Jabalpur. At Lohara in the Chanda district, compact hæmatite of extreme purity, containing 70 per cent. of metallic iron, is said to form an entire hill three-eighths of a mile long, 200 yards broad and 120 feet high. The mines are worked by Agaryas and aboriginal tribes, specially the Gonds, and daily wage is about 4 annas. Many villages have their diminutive blast furnaces, but the *loharis* make no use of the hæmatite, but prefer a soft porous clayey limonite or brown iron ore. It has been pointed out by the reporting officer that the values returned for iron ore are extraordinarily discrepant, a fact doubtless due to some of the figures being intended to express crudely made pig iron and not iron ore. Several interesting facts have been received from the Central Provinces in connection with the distribution of the ore and the smelting of iron, and since the information is too detailed for incorporation in this review, it is intended to publish it in the form of an *Agricultural Ledger*.

Following the customary procedure it may, however, be stated that the production of 1897 denotes an expansion equal to as much as 30·65 per cent. on the record of 1896. Jabalpur alone produced 707 tons valued at R516. In Balaghat the ore was not quarried, but collected from the hills wherever it was found.

MADRAS.

79. ***MADRAS.***—With the opening of the East Coast Railway and the discovery of workable seams of coal within practicable distance, great progress was expected of the local iron industry. The actual amount of iron ore collected has been given as 1,011 tons, which shows a falling-off of more than one-half from the 2,296 tons returned for 1896. The districts that participated in that trade were Malabar (by far the most important so far as the figures indicate), Salem and Anantapur. In Malabar iron ore is only worked in the Ernad Taluk, where operations are carried on by petty ryots who have no statistics to show the quantity and value of the ore dug out. The decrease in the output this year is due to the iron foundry having been destroyed by fire and the work stopped. The Native State of Sandur has produced large quantities, but work was suspended last year on account of the famine. The total output given, however, for the presidency presents a decrease of 55·96 per cent. on the production of 1896, but the reader, after having perused the remarks offered in connection with the Central Provinces, will see that no good can be expected by contrasting the figures of one year with those of another when they are submitted in both cases as "only rough guesses made by village officers."

80. Mr. Middlemiss, of the Geological Survey of India, reports that the iron ores of Salem contain only 40 per cent. of iron instead of 60 per cent. according to previous authorities, so that an allowance must be made in previous estimates of iron production. Mr. R. D. Oldham is very doubtful about Madras iron ores being worked at a profit. He says: "There is no industry so keen and profits cut so close as in iron manufacture, and experience has proved that it can only be profitably carried on on a large scale and in places where the natural advantages of cheap fuel, ore, and transport, and proximity to a large market are combined. In these circumstances it is on the face of it improbable that a profitable industry could be established in Madras, but the matter can only be settled by actual trial."

The Government have ordered two tons of ore from Salem to be sent to Messrs. Bolchow, Vaughan & Co., of Middlesborough-on-Tyne, who are willing to determine by actual trial the value and cost of production of pig iron made from Indian (Kanjamalai) ore and Indian coke. For the treatment of two tons of ore five tons of coal are required, and the Bengal Coal Company has offered to supply the latter at cost price.

81. The iron ores of the Javadi hills have also been examined by the Geological Survey during the year. The result shows that the upper parts of the ridge contain several beds of magnetic, hæmatite and quartz. In the western base of the hills there is a series of magnetic iron beds imbedded with various varieties of gneiss. The bands of ore are very thick and extend for several miles. Specimens have been distributed for analysis.

The results obtained at the Research Department of the Imperial Institute, published in this Review for 1895, show a considerable range in the value of the Indian iron ores represented by the 20 samples examined. Out of six, however, from Kanjamalai, four contained over 63 per cent. of available iron, the other two 36·44 and 35·73, respectively.

IRON: PRODUCTION, NATIVE STATE.

82. *NATIVE STATES.*—It will be seen from Statement I (*page 74*) that the States of the Central Indian Agency return their production as 1,364 tons, or a decrease of 22·93 per cent. from that of 1896 and on the average for the three previous years of 42·42 per cent. Doubtless this is due as much to greater accuracy in tabulation as to any such decrease in production. The supply was obtained chiefly from Narwar (in Gwalior), and Bijawar and Panna in Bundelkhand. Rajputana showed a slight decrease from 855 tons in 1895 to 632 tons in 1896, or 26·08 per cent. In 1897 the yield from all the mines in this State advanced to 1,174 tons, valued at R30,410. The supply is mainly obtained from Ulwar, Meywar and Bandwara.

The most noticeable feature of the iron ore returns of Native States in 1895 was the very greatly enhanced production of Mysore, namely, 1,335 tons, or an expansion of 37·35 per cent., but during the year under review the outturn has been 1,094 tons, which, compared with that of 1896 (1,119 tons), shows a slight decrease. The largest output was in the Shimoga district.

TRADE. IMPERIAL.

XV.—FOREIGN TRADE IN IRON AND IRON MANUFACTURES.

83. As having a distinct bearing on the future prospects of the Indian indigenous iron industries, it may be useful to give some statistics of the foreign traffic in iron and iron manufactures :—

Imports of Iron and Iron Manufactures including Government Stores.

DESCRIPTION OF ARTICLE.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.
	₹	₹	₹	₹	₹
Iron, wrought and unwrought .	2,73,58,470	2,69,34,722	2,49,31,251	3,07,50,733	3,08,56,078
Steel	41,34,884	65,00,891	61,23,621	1,08,86,924	1,04,61,663
Hardware and Cutlery * . .	1,34,12,774	1,42,45,653	1,45,18,428	1,52,43,815	1,77,50,335
Machinery and Millwork . .	2,47,78,351	2,60,70,281	2,55,60,513	3,32,09,668	3,57,99,001
Railway plant	2,32,19,895	2,33,45,628	2,80,31,850	3,54,01,188	4,96,59,349
TOTAL .	9,29,04,374	9,70,97,175	9,91,65,663	12,54,92,328	14,45,25,826

* The figures of hardware and cutlery include electroplate which, strictly speaking, should not appear under iron.

Increased demand for Steel.

84. Mr. J. E. O'Conor's Review of the Trade of British India for 1896-97 on the subject of Iron and Steel exhibits the present position of the trade. The following were the imports during the past ten years :—

	Iron. Cwt.		*Steel.* Cwt.
1887-88	4,321,587	1887-88	420,927
1888-89	4,002,793	1888-89	542,388
1889-90	3,68,405	1889-90	468,396
1890-91	3,876,556	1890-91	715,465
1891-92	3,68[illegible],489	1891-92	773,036
1892-93	3,596,239	1892-93	621,556
1893-94	3,709,617	1893-94	1,039,819
1894-95	3,250,403	1894-95	905,333
1895-96	4,100,246	1895-96	1,702,253
1896-97	3,892,743	1896-97	1,553,181

It will be seen that the imports of iron improved very considerably, still they were less than in 1887-88, and as Mr. O'Conor says in his review for 1895-96, the trade is non-progressive.

Turning now to the returns of the trade in steel, it will be seen that the imports of 1895-96 were the highest on record and that they are 88·02 per cent. in excess of those during 1894-95 and 8·75 per cent. in excess of the imports of last year.

The table which will be found below (*paragraph 85*) reveals the fact that the supply of steel drawn from the United Kingdom during 1896-97 slightly exceeded the previous year's imports, and that the lowest annual supply drawn from the United Kingdom, shown in the table, was in 1883-84, when the imports stood at 240,149 cwt.; last year's figure thus represented an expansion of 197·27 per cent. on the amount obtained 14 years ago. An even more notable state of affairs, however, is the expansion of the traffic with Belgium. The imports from that country in 1883-84 were 10,981 cwt. of steel and last year 806,815 cwt. or an expansion of 7,247·37 per cent.

IRON: TRADE. IMPERIAL:

The following are the principal forms in which iron and steel are imported :—

Chief items of Iron and Steel Imports.

Iron.	1895-96. Cwt.	1896-97. Cwt.
Bars	593,426	538,627
Galvanised	726,430	815,294
Sheets and plates (including tinned plates)	561,887	485,562
Pipes and tubes	383,771	353,823
Angle, bolt, and rod	757,795	781,613
Beams, pillars, girders, and bridge-work	244,774	153,516
Pig	201,057	260,958
Nails, screws, and rivets	211,355	179,725
Hoop	92,394	89,923

Steel.	1895-96. Cwt.	1896-97. Cwt.
Bars	598,943	582,745
Sheets and plates	321,511	287,838
Hoop	223,536	221,743
Cast	8,516	15,330

Decline of British supplies.

85. Belgium and Germany continue to compete actively in India with iron and steel of British manufacture.

The returns of last year show a satisfactory expansion, however, of the demand for British Iron and Steel with a decrease in that from Germany.

Year.	From United Kingdom.		From Belgium.		From Germany.		From Other Countries.	
	Iron.	Steel.	Iron.	Steel.	Iron.	Steel.	Iron.	Steel.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
1883-84	3,473,619	240,149	86,567	10,981	9,411	1,609	13,975	687
1888-89	3,715,081	456,556	262,436	77,976	11,928	7,063	13,348	799
1893-94	2,320,839	420,158	1,223,332	518,395	108,334	100,188	63,112	1,078
1894-95	1,936,721	369,753	1,176,179	448,091	75,264	84,083	42,239	3,406
1895-96	2,479,453	710,581	1,377,754	936,498	50,491	52,753	92,548	2,421
1896-97	2,420,763	713,914	1,295,585	806,815	58,835	26,031	112,560	6,421

86. The exports of iron and iron manufactures from India to foreign countries are not important. The following figures represent the value of these exports during the past five years :—

Indian Exports to Foreign Countries.

Exports of Iron and Manufactures thereof (Indian Produce and Manufacture).

Description of Article.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.
	£	£	£	£	£
Iron, wrought and unwrought	97,620	80,056	69,228	93,581	97,128
Steel	...	...	...	...	...
Hardware and Cutlery *	99,078	84,042	1,34,324	1,90,485	2,29,138
Machinery and Millwork	2,940	540	6,610	1,269	10,271
Railway plant	...	...	...	...	...
Total	1,99,638	1,64,638	2,10,162	2,85,335	3,35,537

* See foot-note, page 27, para. 83.

PROVINCIAL.

XIV.—INTERNAL TRADE IN IRON.

87. ***RAIL AND RIVER-BORNE TRADE.***—As customary in other cases, the subject of Internal Trade practically resolves itself into a criticism of the figures shown under rail and river-borne traffic and in the returns of coastwise trade. The details of local transactions passing by road, from the hill tribes who collect the ore to the village blacksmith, are practically beyond the scope of this review. We may speculate as to the possible amounts so used up, but we can procure no statistics that could be regarded as trustworthy until the smelting of ore assumes the proportions of furnaces and foundries. With an inexhaustible supply of ore it is somewhat significant that so little progress has been made in this direction.

The following analytical statement may be given of the rail-borne transactions returned under the heading of iron during the past five years. These show the imports; but as the exports of one province are imported by another or others, it is perhaps unnecessary in the case of iron to show side by side the exports:—

PROVINCIAL: Rail and River.

Rail-borne Imports of Iron by the Provinces, Native States and Chief Port Towns, during the five years 1892–97.

	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.
British Provinces (Excluding Chief Seaports).	Tons.	Tons.	Tons.	Tons.	Tons.
Bengal	50,348	47,531	41,846	39,000	72,630
Bombay	33,342	36,390	35,398	36,573	36,757
Sind	1,035	1,966	1,357	5,370	2,934
Madras	27,489	23,925	17,006	18,534	21,583
North-West Provinces and Oudh	48,661	55,794	26,841	30,800	33,225
Panjab	28,865	27,616	29,881	33,763	34,434
Central Provinces	13,825	8,522	8,419	6,295	6,552
Berar	5,511	4,666	3,759	4,185	4,425
Assam	7,870	7,303	6,769	10,450	8,436
Total	216,946	213,713	171,276	184,970	220,976
Native States.					
Rajputana and Central India	12,839	10,245	9,208	9,874	10,568
Nizam's Territory	4,154	5,071	10,490	5,458	4,760
Mysore	8,511	10,487	8,466	15,054	10,115
Total	25,504	25,803	28,164	30,386	25,443
Chief Seaports.					
Calcutta	7,771	7,668	4,614	5,292	11,391
Bombay	1,793	816	1,445	1,025	879
Karachi	319	262	170	221	216
Madras ports	3,371	3,684	1,657	2,163	2,001
Total	13,254	12,430	7,886	8,701	14,487
Grand Total	255,704	251,946	207,326	224,057	260,906

Port towns supply Foreign Iron.

In the statement in the Appendix (*pages 102,103*) full details of the figures for last year are given. It will there be seen that Bengal heads the list of importing provinces, having last year secured **72,630 tons** of iron. By far the most important item of that supply appears as an export from Calcutta. Next in importance comes the Presidency of Bombay with the total imports **36,757 tons**, of which, as in the case of Bengal, the major portion was derived from the port town of Bombay. In both these cases, therefore, it may be assumed these figures indicate mainly, if not entirely, supplies drawn from the foreign imports. Following Bombay usually comes the North-West Provinces with last year an import of **33,225 tons**, most of which was derived from Calcutta, the balance from Bombay, Panjab, Karachi, Bengal, Central India and the Central Provinces. In this case also the supplies obtained from Calcutta, Bombay and Karachi may be accepted as foreign iron. The Panjab received **34,434 tons**, more than half of which was procured from Karachi. Madras stands as the next in order of importance as a receiving province, *viz.*, **21,583 tons**. Of that amount Madras port furnished nearly the whole, the balance being derived from Bombay and Mysore.

The imports from foreign countries of iron and steel (*see page 28*) came to 272,296 tons, being 194,637 tons of iron and **77,659 tons** of steel. These figures may, therefore, be placed alongside of the reported production of the Barakar Iron Works, **5,233 tons** as denoting the present necessities of this country and the extent to which these are met by local production. And the returns given as iron by no means convey a complete conception of the future possibilities of this industry. For that purpose it is necessary to take into consideration the facts brought out by the table of foreign imports (*page 28*) of iron and iron manufactures

IRON: TRADE. PROVINCIAL.

which last year were valued at R14,45,25,826. From the imports of iron manufactures alone, a continuous supply is created of old and scrap iron, which is being more and more utilised by the indigenous industries.

Coastwise.

88. ***COASTING TRADE IN IRON.***—By way of completing this statement of India's trade in iron it is only necessary to give here some particulars of the amount of foreign and Indian iron that is distributed throughout the country by means of the coastwise shipping:

Coastwise Trade in Iron—Imports.

Year.	Description.	Into Bengal.	Into Bombay.	Into Sind.	Into Madras.	Into Burma.	Total.
		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1892-93	Indian	98	813	19	194	70	1,194
	Foreign	3,962	4,332	812	5,302	2,674	17,082
1893-94	Indian	70	606	7	336	34	1,053
	Foreign	990	4,559	955	5,163	2,117	13,784
1894-95	Indian	109	584	25	257	62	1,037
	Foreign	2,066	4,295	1,003	3,874	2,095	13,330
1895-96	Indian	97	409	15	153	218	892
	Foreign	6,668	3,768	1,414	4,568	1,982	18,400
1896-97	Indian	235	153	21	128	129	666
	Foreign	2,724	3,646	1,250	3,682	1,903	13,205

Coastwise Trade in Iron—Exports.

Year.	Description.	From Bengal.	From Bombay.	From Sind.	From Madras.	From Burma.	Total.
		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1892-93	Indian	549	895	57	27	5	1,533
	Foreign	2,189	14,592	224	1,831	2,083	20,919
1893-94	Indian	605	1,342	1	29	2	1,979
	Foreign	1,978	18,998	247	827	1,762	23,812
1894-95	Indian	464	1,183	32	163	11	1,853
	Foreign	2,069	13,784	243	361	1,402	17,859
1895-96	Indian	196	766	17	52	25	1,056
	Foreign	1,382	18,754	310	530	1,746	22,722
1896-97	Indian	274	649	6	28	42	999
	Foreign	2,103	12,579	374	474	2,385	17,915

IV.—PETROLEUM (*Mitti-ka-tel*, Hind.; *Penan*, Burm.).

PETROLEUM: PRODUCTION.

XVII.—PRODUCTION OF PETROLEUM IN INDIA.

89. The provinces of India that produce petroleum are Burma, Assam, the Panjab and Baluchistan. In the lastmen-tioned region production may, however, be said to have ceased since operations have been entirely discontinued. In the Panjab the production last year was 2,041 gallons, or 13·66 per cent. less than in 1896 and 8·10 per cent. more than the average of the past three years. The major portion of the Panjab oil was raised at Rawalpindi, the balance of 730 gallons was obtained from Bannu and used in the Railway Engineering Department.

90. ***BURMA.***—The Petroleum refinery business was taken over as a going concern by the Burma Oil Company so recently as 1888. Prior to that, the business had been carried on by a private company for about 23 years. The Rangoon Oil Company was formed about 1865 to purchase and refine the oil produced from the native wells in Upper Burma, but owing to the high prices demanded for the crude oil by the monopolist, who controlled the produce of these wells, the refinery could not be worked to a profit, and as stated above, it changed hands in 1888. In the same year it was turned into a limited company under its present name, and since that time the company has been drilling for oil on modern principles, but has so far obtained barely sufficient oil to keep the Refineries going. With the exception of a few native Refineries in Upper Burma worked upon primitive methods, the Burma Oil Company's Refineries are the only ones in Burma.

The extent of refined production may be taken at about 40,000 tons per annum. PETROLEU M PRODUCTION.

The export of solid paraffin to Europe depends upon the state of the market there, but may be stated at an average of about 15,000 tons per annum.

The production last year (*page 75*) was 18,904,710 gallons or an increased production of 27·59 per cent. on the previous year and 46·49 per cent. on that of the average of the past three years. This is certainly a very satisfactory result, and if a continuous supply and expansion, such as that secured last year, can be maintained, the industry may be regarded as exceedingly prosperous. The increased output is said to be due to some extent to new operations. It may be localised as 15,822,954 gallons from Mágwe district, 2,918,818 gallons from Pokokku district, 107,742 gallons from the Kyaukpyu district, and 55,196 gallons from Akyab.

ASSAM.

91. ***ASSAM.***—Petroleum is found in large quantities at Digboi in Lakhimpur district. There are altogether 29 wells. The output of crude oil last year (1897) was 222,077 gallons, or about 16,000 gallons less than 1896. The decrease is in no manner due to lack of oil, but to want of sufficient refining apparatus. There is some probability of this want being supplied before long, in which case the output will greatly increase.

Petroleum is also found, but not worked in other parts of the Province.

According to the return of large industries, the outturn of the petroleum refinery at Margherita in the Lakhimpur district, belonging to the Assam Railways and Trading Company, Limited, was in 1897 57,500 gallons of oil and 340 maunds of wax valued at R43,000 and R2,550, respectively, against 38,700 gallons of oil valued at R18,000 in 1896. The average number of persons employed in the refinery was 143 in 1897, against 193 in 1896.

Utilisation of Residues.

92. ***PETROLEUM RESIDUES.***—Various processes have lately been devised for utilising the residues obtained in petroleum refineries for purposes of fuel.

Petroleum briquettes have in some cases been made from the refuse by mixing it with ten per cent. of soda lye, ten per cent. of common fat or tallow, and heating the whole until it combines. The cooled mass is then moulded into the shape of bricks which are quite hard and contain a large proportion of combustible matter.

Masut, a bye-product in the distillation of petroleum, being unfit for vaseline manufacture or lubricating purposes, is another source of fuel. It burns with a clear flame and gives out great heat. It is possible to mix it with brown coals which are themselves poor in quality without impairing its usefulness. A property claimed for masut is that it is almost smokeless, and for this reason it has been recommended for employment in the navy.

XVIII.—PROSPECTS OF INDIAN PETROLEUM. TRADE :

93. If it be found possible to produce this oil at paying rates and in sufficient quantity, the home market would be almost limitless. The consumption of mineral oil in India is increasing with marvellous rapidity. The imports of foreign mineral oils rose from a valuation of R5,98,797 in 1870-71 to R48,70,580 in 1880-81, and to R85,18,279 in 1885-86.

Foreign Imports.

The Foreign Imports of oil are derived mostly from Russia. The supply commenced in 1886-87, and is drawn from the Caucasus *vid* the Black Sea, the Straits of Constantinople and the Suez Canal. The imports of American oil have declined since 1893-94, and now they are less than half those of Russia. The fluctuations are shown in the following table of thousands of gallons :—

	From Russia.	From United States.	From other Countries.	Total.
1886-87	1,577	29,144	1,229	31,950
1891-92	28,333	27,293	2,483	58,109
1896-97	45,483	19,312	3,626	68,421

The value of kerosine imported during the past year reached R3,08,82,791 or over three crores of rupees. The increased demand for cheap oil was partly no doubt due to scarcity of local vegetable oils owing to failure of crops. During the past year, Madras imported considerable quantities of kerosine from Sumatra. It is said that the imports of kerosine oil from Sumatra into India last year rose from 558,271 gallons to 5,332,703 gallons.

XIX.—INTERNAL TRAFFIC IN PETROLEUM. PROVINC AL.

94. From the analytical statement shown in the Appendix (*pages 106, 107*) it will be seen that **30,319,032 gallons** of oil were carried on the railways and rivers of India during the year. Bengal was the largest importing province, having taken **11,583,656 gallons**, of which practically the whole was received from Calcutta. After Bengal the North-West Provinces and Oudh would appear to be the most important province, the imports of which were **3,353,880 gallons**, of which the Bengal Province, and not Calcutta, was the chief source of supply. In 1896-97 Bombay would appear to have been the third most important receiving province. Assam may be spoken of as fourth with 2,442,296 gallons, derived exclusively from Bengal and Calcutta. The Panjab, fifth in order of demands, 2,122,320 gallons, the supply being derived mainly from Bengal and Karachi. It is perhaps hardly necessary to mention other particulars, except that the exporting centres are as follows :—Calcutta, 13,155,976 gallons; Bombay port town, 7,123,864 gallons; Madras ports 1,955,232 gallons; and Karachi, 1,521,472 gallons.

PETROLEUM: TRADE.

PROVINCIAL: Coastwise.

Coastwise Traffic in Kerosine Oil and other Mineral Oils.

Imports.

95. By way of concluding this statement of the Indian trade in kerosine and other mineral oils, it is only necessary to give a few details of the coastwise transactions :—

Imports.

Coastwise Traffic.

Year.	Description.		Into Bengal.	Into Bombay.	Into Sind.	Into Madras.	Into Burma.	Total Imports.
			Gals.	Gals.	Gals.	Gals.	Gals.	Gals.
1892-93	Kerosine	Indian	...	...	...	53,115	84,072	137,187
	Ditto	Foreign	652,810	3,144,367	43,886	1,898,697	509,894	6,249,654
	Other kinds	Indian	1,197,467	5,328	...	23,074	230,197	1,456,066
	Ditto	Foreign	2,229	780	503	16,252	10,190	29,954
1893-94	Kerosine	Indian	...	...	...	4,932	188,408	193,340
	Ditto	Foreign	619,094	3,421,391	394,672	2,756,085	442,436	7,633,678
	Other kinds	Indian	1,376,402	4,971	...	16,530	195,456	1,593,359
	Ditto	Foreign	4,579	408	4,486	27,300	8,385	45,158
1894-95	Kerosine	Indian	355	...	...	11,838	240,326	252,519
	Ditto	Foreign	303,123	3,663,583	420,608	1,657,117	387,621	6,432,052
	Other kinds	Indian	1,529,093	20,265	...	25,518	247,645	1,822,521
	Ditto	Foreign	11,318	713	789	31,591	9,327	53,738
1895-96	Kerosine	Indian	41,360	...	...	20,705	355,250	417,315
	Ditto	Foreign	639,276	2,962,546	601,252	1,570,378	390,339	6,163,791
	Other kinds	Indian	2,049,609	17,299	...	11,500	236,101	2,314,509
	Ditto	Foreign	3,994	2,318	775	48,744	10,067	65,898
1896-97	Kerosine	Indian	38,000	...	...	4,030	244,731	286,761
	Ditto	Foreign	1,147,823	2,380,644	84,897	2,540,006	407,330	6,560,700
	Other kinds	Indian	2,636,965	7,816	...	19,585	235,000	2,899,366
	Ditto	Foreign	8,445	2,310	1,014	70,100	22,352	104,421

Exports.

Year.	Description.		From Bengal.	From Bombay.	From Sind.	From Madras.	From Burma.	Total Exports.
1892-93	Kerosine	Indian	364	...	...	224	171,679	172,267
	Ditto	Foreign	696,261	7,535,020	496,388	49,592	475,242	9,252,503
	Other kinds	Indian	3,500	...	...	...	1,456,103	1,459,603
	Ditto	Foreign	18,229	32,391	...	558	275	51,453
1893-94	Kerosine	Indian	...	...	...	112	285,776	285,888
	Ditto	Foreign	760,202	10,525,863	31,489	74,594	405,395	11,797,543
	Other kinds	Indian	6,294	...	...	...	1,582,724	1,589,018
	Ditto	Foreign	8,225	61,261	47	76	3,388	72,997
1894-95	Kerosine	Indian	...	...	...	462	359,288	359,750
	Ditto	Foreign	359,581	8,310,399	114,489	142,231	358,744	9,285,444
	Other kinds	Indian	12,245	...	...	...	1,799,858	1,812,103
	Ditto	Foreign	26,842	68,895	750	97	2,093	98,677
1895-96	Kerosine	Indian	417	...	...	240	402,904	403,561
	Ditto	Foreign	1,126,777	7,853,567	39,476	137,287	352,329	9,509,436
	Other kinds	Indian	11,487	120	...	...	2,267,406	2,279,013
	Ditto	Foreign	50,225	78,818	10	39	4,735	133,827
1896-97	Kerosine	Indian	...	...	...	3	999,212	999,215
	Ditto	Foreign	1,616,623	8,131,636	124,640	104,642	346,840	10,324,381
	Other kinds	Indian	9,078	...	...	1	2,412,868	2,421,947
	Ditto	Foreign	73,565	99,877	45	44	4,433	177,964

In the above tables it will be observed that effort has been made to distinguish Indian from foreign Petroleum. In calculating quantities the Bengal standard of 280 gallons to the ton is employed.

Statement II.

MINERALS REGARDING WHICH DEFINITE STATISTICS CANNOT BE FURNISHED.

96. The information called for under this heading was intended to amplify, and, if possible, bring up to date the returns published in previous Reviews regarding the more important minerals for which definite statistics are not available. The returns for the year 1897 in most cases affirm that nothing further can be said regarding the majority of these minerals than has already been published. It is not, therefore, deemed expedient to attempt to express the information called for under the prescribed Statement II in the form of Statistical Tables.

V.—GOLD (*Soná*, HIND.; *Shire*, BURM.).

97. ***OCCURRENCE.***—Gold may be said to be found in the following localities:—

(1) MADRAS.—Madura, Coimbatore, Salem, Wynaad, Nilgiris, Travancore, Malabar, South Kanara, North Arcot and Bellary.

(2) MYSORE.—Kolar and Shimoga districts.

(3) NIZAM'S DOMINIONS.—Khammamett district, Topuldodi; Wandali (Raichur Doab).

(4) BENGAL.—Orissa, Midnapur, Bankura and Champarun districts; Chutia Nagpur (Lohardaga), (Udaipur), Manbhum, Singhbhum and Darjeeling.

(5) CENTRAL PROVINCES.—Chhattisgarh, Nagpur and Jabalpur divisions.

(6) CENTRAL INDIA.—Ajmere-Merwara district.

(7) BOMBAY.—Dharwar, Belgaum and Kaledgi districts and in Kathiawar.

(8) PANJAB.—Bannu, Peshawar, Hazara, Rawalpindi, Jhelum, Kangra, Amballa, Gurgaon and Hoshiarpur districts.

(9) NORTH-WEST PROVINCES.—Bijnor, Naini Tal, and Garhwal districts.

(10) ASSAM.—River-sand, especially of Lakhimpur district.

(11) BURMA.—Throughout the greater part of Lower Burma, especially in the river-sands of Tenasserim, and in Upper Burma in several districts, particularly in Katha. It also occurs in Ruby Mines district (in Momeik) and is obtained chiefly in the shape of dust in the dry nullahs in the Engdaing jungles. In Ye-u it is found in small quantities by washing in the Shwegyin and Tazê townships, also in Indaing township.

AURIFEROUS SAND-WASHING.

AURIFEROUS SAND-WASHING.

98. A definite statement of the annual production of gold for the whole of India cannot be furnished. Washing of auriferous beds takes place here and there all over the country. It is purely a native industry, and it is therefore impossible to obtain statistics that could be advanced with any degree of assurance. The industry of gold-washing is, moreover, for the most part spasmodic, a sort of by-product with certain communities. The particulars furnished, for the year 1897, regarding gold-washing, may be said to perfect in some instances former returns, but more with the view of arriving at a figure of average annual outturn than of giving actual production.

Earnings.

In Burma, the earnings during the working season have been put at three annas a day. Mysore sand-washings are said to have yielded four annas. In Chutia Nagpur (Udaipur State) the earnings have been put at three to four annas. In the Central Provinces (Jabalpur) at four annas, where also it is held that the goddess who makes the gold would leave the locality should at any time the earnings exceed that amount. In the Panjab (Peshawar) the daily rate is put at 2 annas or (Rawalpindi) at 3 to 4 annas. But it should be recollected that in no locality in India can river-sand-washing be carried on throughout the year.

AURIFEROUS SAND-WASHING. Estimated Production.

99. The returns furnished of production from auriferous sands do not exceed 2,000 ounces for any year on record, and it is thus perhaps safe to assume that a yield of 10,000 ounces would be the very highest admissible as the production of gold from river-washings. But even were we to accept an estimate of 40,000 ounces of gold as annually produced by the washing of the sands of certain rivers, that amount would have to be regarded as insignificant when compared with the success that has attended gold mining in Mysore. In fact, the chief interest in the gold-washings might be said to lie in the feasibility of their giving indications of the possibility of the extension of mining operations.

GOLD: TOTAL OUTTURN.

100. *OUTTURN.*—Before proceeding to review the available information on the subject of the Indian gold mines, it may be as well to record in this place the returns furnished by the Local Governments of the gold production for the year under review, compared with those of the two previous years :—

GOLD PRODUCTION OF INDIA IN 1895-96-97.

Locality.	1895.		1896.		1897.	
	Oz.	₹	Oz.	₹	Oz.	₹
Madras . . .	1,383	91,328	1,917	1,13,268	897	52,506
Mysore . . .	246,758	1,74,30,370	340,336	2,11,16,493	387,139	2,22,21,486
North-West Provinces .	54	3,478	81	4,917	50	2,761
Panjab . . .	447*	22,612	447*	22,612	447*	22,612
Kashmir . . .	37	1,342§	27	1,180	...	...
Hyderadad . . .	99	2,910†	Not stated.		495	26,393‖
Burma	107‡	6,000	Not stated.		Not stated.	
Bengal	...	...	...	...	...	...
TOTAL .	248,885	1,75,58,035	342,808	2,12,58,470	389,028	2,23,23,758

* Originally returned as the production of 1891, and not subsequently modified; may be accepted as the mean annual production.

† The same quantity and value are given in 1895 as in 1894. It is explained that the quantities cannot be given, as the working of the mines is given out on contract.

‡ Value only furnished : the quantity has been estimated on the ratio of previous quotations.

§ Value of 28 ounces.

‖ Calculated at the rate of 1*s.* 3*d.* = R1.

The total production of gold in India thus expanded by 13·48 per cent. on the quantity and 5·02 per cent. on the value, as compared with the previous year's returns. And if the comparison be carried back to 1892, it is found that last year's production manifested an expansion of 135·93 per cent.

Of the Gold Mining Companies the following facts have been gathered from the published reports to hand. The Directors of the Mysore Gold Mining Company at their eighteenth annual general meeting laid before the shareholders on 29th March 1898 a statement of the accounts of the Company. This exhibited a gross income of £499,532-14-4, which, after deducting working expenses and royalty, left a profit of £326,172-9-3. During the year the Company distributed three dividends amounting to £275,000 equal to 110 per cent. upon the nominal capital. The nominal capital stands at £250,000 and the shares issued 500,000. Since the creation of the Company in 1886, the total amount paid comes to £1,424,405-5-2.

The Champion Reef Gold Mining Company in their ninth report show the gold produced to have realised £448,521-8-3, thus giving a net profit of £230,671-12-4. The distribution during the year came to £220,000 or 100 per cent.

The Ooregum Gold Mining Company of India at their annual general meeting declared gross receipts £208,707-15-8, the net profit on working of the mines £198,847-0-1, and this represented dividends at 12½ per cent. on the ordinary shares and 22½ per cent. on the preference shares. The capital of the Company is £145,000 ordinary and £120,000 preference. The total amount paid since 1891 came to £704,500.

The Nundydroog Company at their fifth ordinary general meeting, held on the 1st April 1898, showed their income to have been £212,652-16-7, the disposable net profit £123,951-19-5, of which £93,500 was paid or 42½ per cent. upon the nominal capital. The Company existed from 1888 to 1892 under the name of The Nundydroog Gold Mining Company, Limited, and paid during these years £140,652-19-10. Since then it has been known as The Nundydroog Company, Limited, and has paid in dividends £278,721.

FOREIGN TRADE.

101. *FOREIGN TRADE.*—Before proceeding to discuss these very striking figures of production of gold, it may perhaps be as well to furnish a statement of the Imports and Exports in the precious metal :—

The following table shows the Imports and Exports between India and foreign countries during the past five years, as also by way of comparison the figures for 1852 and 1872 :—

Table showing Total Imports and Exports of Gold.

YEAR.	IMPORTS.		EXPORTS.	
	Ounces.	Value in Rupees.	Ounces.	Value in Rupees.
1892-93 .	272,442	1,78,17,891	726,925	4,59,44,720
1893-94 .	474,635	3,14,65,300	378,399	2,50,52,840
1894-95 .	236,873	1,75,62,800	926,843	6,73,03,740
1895-96 .	695,055	5,02,92,692	372,432	2,59,33,168
1896-97 .	657,238	4,49,11,790	347,873	2,20,01,407
Average of past five years .	467,248	3,24,10,094	550,494	3,70,67,175
1852-53 .	...	£1,341,106	...	£168,805
1872-73 .	...	£2,622,371	....	£79,000

The proportion of these marvellously increased exports of gold that can be attributed to the rapidly increasing production cannot of course be determined. With the fall in the value of silver the hoards of gold in India seem to have been drawn upon and the gold poured out of the country. This drain now gives, however, what may be regarded as an indication of abatement. Last year, the exports were 347,873 ounces valued at R2,20,01,407, or a decrease of 6·59 per cent. on the quantity and of 12·11 per cent. on the declared value of the previous year's exports.

GOLD MINING IN INDIA.

102. ***MYSORE GOLD MINES.***—Though very much more is heard of coal and coal-mining in India than of gold, the latter is of greater intrinsic value than the former. The declared value of the gold produced last year from the mines of Mysore and the adjacent British district in Madras came to R2,22,73,992 or, estimated at the rate of exchange of 1 shilling and 3 pence, to £1,392,124. As compared with that figure, coal-mining (last year's value £779,161) has very distinctly to take a second position. The potential value of coal is not, however, to be compared with that of gold. It gives vitality to the entire industries of the country, and thus secures a nation's well-being in place of the prosperity of a few owners and a limited number of employés. It has been thought desirable, however, to emphasise the importance and value of the Indian gold mines, since it is customary to find them relegated to a position of insignificance among the minor and undefined industries of the country. Through the pluck and perseverance of a few Englishmen, gold-mining has within the past decade been raised to a position of great importance.

103. ***POSITION AND CHARACTER OF THE MINES.***—"The present working (Mr. Grundy tells us) covers a tract of country almost exactly nine miles long. There are upwards of 62 shafts in use and a large number out of use. The depths of the shafts in use vary from about 30 feet to nearly 1,500 feet; several of them are considerably over 1,000 feet deep, and quite a large number over 500 feet." "The lodes run in a nearly north and south direction, consequently the whole of the mines are in a nearly north and south line. The most southerly mine is Mysore Reef; and this mine occupies the unique position of being the only mine included in the 'Kolar Gold Field', that is outside of the Mysore State."

"The most northerly workings are two prospecting mines belonging to the Gold Fields of Mysore Mining Company, and almost exactly nine miles in a straight line from the Mysore Reef Mine." The breadth of the field is comparatively small.

"Ladders as a means of ingress and egress is the universal rule; so that to get into, and out of, and about the mines during the 29 underground inspections, I travelled along 27,314 feet or nearly 5¼ miles of ladders in shafts, winzes, etc."

"There are about eleven distinct Mining Companies, nine Superintendents in charge, nineteen Mine Captains and underground foremen. The underground employés number 7,000; and 5,360 are ordinarily employed aboveground in addition to a large number of extraordinary employés." Mr. Grundy points out that the number of employés is about ⅓rd of the total number employed underground at all the 825 metalliferous mines of the United Kingdom. And he adds "much of this is due to the fact that the work done per man in India is very little. But the accumulated work done at these mines, on any one day, is very great, for the mines are extensive, and are worked energetically."

104. ***ENUMERATION OF THE MYSORE MINES.***—In 1896 there were 12 mines in the Kolar district, 3 in Shimoga, 2 in the Hassan district, and 1 in Mysore district. The relative importance of these mines may be roughly indicated by the number of persons employed:—

	Number of persons employed.
1. The Mysore Gold Mining Company, Limited	2,650
2. The Ooregaum Gold Mining Company, Limited	2,502
3. The Champion Reef Gold Mining Company, Limited	2,346
4. The Nundydroog Gold Mining Company, Limited	1,778
5. The Balaghat Mysore Gold Mining Company, Limited	1,079
6. The Kempinkote Gold Mining Company, Limited	415
7. The Yerrakonda Gold Mining Company, Limited	340
8. The Coromandel Gold Mining Company, Limited	320
9. The Mysore West, and the Mysore Wynaad Consolidated Gold Mining Company, Limited	300
10. The Nine Reefs Gold Mining Company, Limited	289
11. The Oriental Gold Mining Company, Limited	234
12. The Gold Field of Mysore Company, Limited	20
TOTAL EMPLOYÉS	12,273

Of that number, 7,117 work below ground.

105. The following jottings may be given from the returns of mineral production during the year 1897, as showing the position of the industry of gold-washing or gold-mining in the province concerned:—

BENGAL.—The Sonapet Prospecting Gold Mining Company have continued to carry on prospecting works at Gatuhata in Lohardaga. There are no mining companies at work in the Province. It has been suggested that systematic borings on scientific principle should be made in the gold-bearing area of Chutia Nagpur before the mines are abandoned.

GOLD :
GOLD MINING.

MADRAS.—The quantity of gold produced in this Presidency amounted to 897 ozs., valued at ₹52,506. Most of this was obtained from the Kangundi Zemindary in the North Arcot district from a mine worked by the Mysore Reefs Gold Mining Company. Twenty-one ounces (49½ tolas) to the value of ₹1,341 were produced by different parties in South-East Wynaad by washing at the site of the abandoned Devala gold mines.

MYSORE.—The information furnished by this State has been incorporated in the foregoing remarks. As will be seen above, there are in all 18 mines in the State, and these give employment for 12,273 persons.

BURMA.—At Kyaukpazat Katha district, Mr. Wright has erected a crushing-mill, has exposed 240 feet of reef and several shafts aggregating 241 feet in depth. Up to November 1895, the sale of gold totalled ₹6,000, and the number of persons employed is said to have been 113. Commenting on this mine, the official returns for 1896 state that for the purpose of gold-mining a tract of country ¼ of a mile square at Chaukpazat in the Mawnaing circle, Mawnaing township of the Katha district, was leased to Mr. C. M. P. Wright for a term of 30 years with effect from the 1st April 1895, at a yearly rental of ₹160 and a royalty of 5 per cent. on the saleable value of all gold obtained from the mines opened in the tract. The concession has recently been transferred to a Company. The mine or quartz reef is situated among low hills and is on the side of a steep slope. It is fully exposed to view and is about 80 yards long by 18 to 20 feet deep. A mill has been set up at a distance of about a mile from the mine with all necessary crushing apparatus and machinery. Several shafts have been sunk and work is being carried on with satisfactory results.

No women or children are employed either above or below ground. Burmans receive eight annas a day wherever they work, above or below ground, at the mine, working 8½ to 9 hours, with half-an-hour midday rest and in the mill 10 hours with half-an-hour's rest. The mill mechanics and coolies work 12⅝ hours, with 1½ hours off during the day. Their wages are—driver ₹2·8 per diem; mill coolies 10 annas per diem; the latter receive in addition ₹5 per mensem for regular attendance and good conduct, which brings their wages up to 12¾ annas per diem.

NORTH-WEST PROVINCES AND OUDH.—The only districts in which gold is found in any quantity in these provinces are Bijnor, Naini Tal and Garhwal. The estimated production in 1897 has been reported at 50 ozs., valued at ₹2,761. The general method of working this mineral is the washing of auriferous sands found in the beds of certain rivers, most notably Ramganga, Sukhar Sot, Phika and Khoh in the Nagina tahsil of Bijnor district.

PANJAB.—The average yield for the five years ending with 1890 at Bannu was ₹139, at Rawalpindi ₹206, and at Hoshiarpur ₹400. The average yield at Umballa, for the five years ending with 1897, was ₹167, and for twelve years, 1886—1897, ₹135.

KASHMIR.—Gold weighing 65 tolas 7 mashas from Skardu tahsil obtained in 1896 by manual labour from sand at the bank of the Attock river and purchased at the rate of ₹18 per tola, value ₹1,180-8, annually recovered in revenue from Sbagar ilaka.

Grants and Licenses.

106. ***MINING GRANTS AND LICENSES.***—During the years 1889 to 1895, 35 grants and licenses for gold were issued, of which 14 were made in 1895: during 1896, the number issued was eight, and in 1897 nine. These do not, however, include the lincenses and grants issued by the Mysore Government.

PRECIOUS STONES.

AMBER.

VI.—AMBER (*Kah rubá*, HIND.; *Payin*, BURM.).

107. ***OCCURRENCE.***—The only locality in India where Amber (a fossilised resin) is known to occur with any certainty is Myitkyina in the Hukong valley of the Bhamo district of Upper Burma. Since the annexation of that province the right to collect the duty on the mineral (5 per cent. *ad valorem*) has been sold by auction, together with that of Jade licenses.

108. ***OUTTURN.***—From the returns for 1897 it is learned that about 26½ cwt., valued at ₹4,990, was extracted during the year. The outturn in 1894 was given as 87lb, valued at ₹160. That for 1893 was stated to have been 549 cwt., valued at ₹2,900. In explanation of the variation in the price, the Deputy Commissioner remarked that in 1894 Amber was reported as obtained in one month only, whereas in 1893 the price varied from month to month, ranging from ₹2 to ₹20 per *viss*. He also affirmed, moreover, that the outturn for 1893 was doubtless incorrect, and that in this matter accuracy could not be expected in the returns. The price at the mines usually averages from ₹6 to ₹15 a *viss* (=3·65lb), and in Mandalay from ₹15 to ₹40. The yellow form is more rare than the red.

The Amber mines are worked by Kachins in a fitful and haphazard manner. In excavating, a shaft is sunk for 70 to 80 feet. Should the miners be fortunate enough to strike a vein, a side passage is made following the vein. At certain points lumps may be found which sometimes weigh as much as 1,000lb. These blocks of Amber are carefully removed, then sawn into the required shape and size.

109. ***MEDICINAL FORM.***—A variety of Amber called *Payinswe* used to be sold by the miners to the Chinese and taken to China, where it is used as a medicine.

BERYL.

VII.—BERYL—EMERALD (*Sabzá Panoa, Fastiki Kerasi*, HIND.).

110. ***OCCURRENCE.***—This mineral is not alluded to in any of the reports obtained for the years 1894 to 1896. There is a famous old mine in the Coimbatore district of Madras Presidency, but it is

not now worked. Beryls are reported to have been found at Viniambadi at northern base of the Nilgiris and at the foot of Lambton's Peak. [*Provincial Index* (*Madras*), *p.* 20.] The mineral is also found in several localities of the Panjab Himalaya, in Hazaribagh and Rajmahal in Bengal; near the Talchir coal-field of Orissa; and its occurrence in isolated positions throughout Rajputana has been repeatedly published but as yet no industry has been organised for its utilisation. Experimental borings were this year made in the lands of the Sarwar Kasba in Kishengarh for beryl. The outturn was a mineral of an inferior kind and has been taken over by the Benares jewellers. BERYL.

VIII.—DIAMOND (*Hira*, HIND.). DIAMOND.

111. ***OCCURRENCE.***—Diamonds are said to have been found over six areas, *viz.*:—

(1) The Kistna valley side of the Deccan.

(2) The Madras Presidency, in the districts of Anantapur, Cuddapah, Kurnool and Godavari (Ellore).

(3) Chutia Nagpur in Bengal.

(4) The Central Provinces.

(5) Bundelkhand.

(6) Nizam's Dominions.

112. ***PARTICULARS OF MINING AND WASHING.***—While the gems actually do occur in the regions named, or have been reported as found, the industry of mining or washing for diamonds can hardly be said to be a flourishing one anywhere in India. The least important localities are Chutia Nagpur and the Central Provinces. Indeed, the reputation of Diamonds in Chutia Nagpur may be regarded as highly doubtful. Diamonds were, however, formerly found in the neighbourhood of Hirakhoond in the Sambalpur district of the Central Provinces, where, in the days of Native rulers, operations were regularly prosecuted by damming and washing to search for the gems. The work was in the hands of professional diamond-washers known as *Jhirias*, who were liberally rewarded by grants of land for valuable finds. Mr. F. H. Smith, of the Geological Survey, from observations made during a recent tour, reports that the industry of washing for diamonds at Hirakhoond seems to have entirely died out.

It is thought that diamonds may also be found in some of the crystal pits near Gorpur, Kobra, Dhundee Towa in the Betul district, and near Pattan in the Maltai tahsil of the same district, but no precise information is available.

The Hyderabad (Deccan) Company have carried on exploratory workings at certain localities in the Hyderabad State with partial success. From their workings over 3,000 diamonds have been obtained, but the stones being minute the proceeds obtained bore an unsatisfactory relation to the outlay incurred. The Company claim to have found old workings at certain places in the Ghanpura Circar, but the nature and capacity of these deposits remain to be exploited. The most recent returns of the Deccan Diamond workings are those of 1891, when the outturn for the Hyderabad State was put at 862¾ carats valued at ₹15,530. From the Kistna valley side of the Deccan, the outturn for the two years 1888 and 1889 is recorded at 93 carats, valued at ₹108. Later operations have, however, increased this considerably. No statistics are obtainable from the other districts of the Madras Presidency. It is said that the supply from the Ramalcotta washings has been unremunerative. Diamonds are met with near Banganapalle on 400 acres of land bordering the river, but there has been no industry for some years past.

113. ***OUTPUT.***—The value of the diamonds extracted from the mines in Bundelkhand during the year 1893 was put at ₹20,5 19, and the report of the workings of 1894 showed a production of 210¾ carats valued at ₹16,251-8-2. The corresponding figures for 1895 are 215 carats, valued at ₹19,506 and those for 1896 are 321 carats, valued at ₹22,017. The outturn for 1897 is reported at 301$_{1}^{3}_{6}$ carats, value ₹19,031. These diamonds are mostly obtained on the Panna plateau, which is shared by several Native States. Occasionally a few stones are carried by the rains down to the plains and are there to be found by superficial washings. Production in Bundelkhand fluctuates very greatly. There are no State works and no capital expended, consequently a shaft once sunk has to be abandoned after the rains, from want of machinery to keep it open. The method of procedure is accordingly chiefly by superficial mines which are worked during the rains, since no water is available during the hot season.

IX.—GARNET (*Yaqut Chunni*, *Mehtab*, HIND.). GARNET.

114. ***OCCURRENCE.***—The Garnet is common in various localities in India, those of Rajputana being the most important. In the Madras Presidency they occur in Vizagapatam, Godavari, Trichinopoly and Tinnevelly. [*Prov. Index* (*Madras*), *page* 22.] The stones found in South Canara, Nellore and Salem districts of the Madras Presidency have been pronounced as practically of no value and those of Monghyr district in Bengal are so much fractured that they do not appear to be marketable.

Garnets are fairly abundant in Burma, as, for example, throughout the Mogok township, in the eastern and hilly portion of Twinnge township of the Ruby Mines district, and also in parts of Momeik States.

115. ***TRADE IN GARNETS.***—The Garnets of Rajputana are, however, of considerable value. The stone is met with in the Bhilwara district of Meywar. The revenue derived in 1894 from this source was ₹3,549, in 1895 ₹1,775-15, and in 1896 ₹770-1. Returns showing quantity yielded during 1896

GARNET. received as under—Kishengarh 32 maunds or, s[redacted]5 cwts. obtained from 25 mines during the year 1896, Value not stated. The mines at Sarwar in the Kishengarh State, Rajputana, are being constantly worked and yield an average annual produce of 363,760 carats and an annual revenue of ₹7,000. These mines are generally worked by the local Jogis and Malies, who are great experts at prospecting for Garnet mines. The Sarwar garnets are considered the best in Rajputana and are greatly prized, on account of their deep pink brilliant colour, for making jewellery, of which there is a flourishing industry at Sarwar. There are some fifty manufactories of garnet jewellery worked by the local Muhammadans, who sell to the Mahajan traders, from whom the European firms and exporters receive their supplies. The total number of persons employed at the quarries is 125. The Bagree or Garnet turners earn from six to twelve annas a day. The wages for turning and cutting Garnets vary from 2½ annas per tola to 3 annas per tola. The Garnet quarries of Sarwar are generally not very deep, being 8 feet to 15 feet in depth. In some cases, however, when the find is of a specially inferior quality, they are as deep as from 40 to 50 feet. In such cases the shafts have to be drained, and for this purpose the quarry-men generally employ the ordinary *chuttus* and bullocks.

JADE.

X.—JADE and JADEITE (*Yashmi*, HIND.; *Kyauksein*, BURM.).

116. ***OCCURRENCE.***—A stone known in commerce as Jade is extensively worked in the Mogaung sub-division of the Myitkyina district and in the Upper Chindwin and Katha districts of Upper Burma. Its colour varies from pearly grey to dark green. It is in very general demand throughout China. A variety highly prized by the Chinese is pale grey, with bright apple-green spots, clouds, and veins. A block of less than a cubic yard in size was some years ago valued in Rangoon at £10,000, and the Chinese are said to have offered £8,000 for it.

The Myitkyina Jade-producing country is by far the most important. It may be described as a region lying between the 25th and 26th parallels of latitude, and shut in by the Chindwin and Mu rivers on the west and east, respectively. The mines now being worked are known as Tawmaw, Paungmo, Iku, Matiemmo, and Nienmo. The Tawmaw quarries have been worked for several years, but the stone is by no means exhausted. The Jade quarries of Katha district are situated about 12 miles north of the Mawhum hill, some 60 miles from the head-quarters of the district. The Jade extracted from these quarries is inferior to that produced in Myitkyina, where the present mines yield a better class of stone than in 1892.

117. ***PRODUCTION.***—The outturn in Myitkyina in 1894 was estimated at 727 cwt., valued at ₹1,15,091. The outturn in 1895 has been given as 37,513 pieces valued at ₹1,30,543. That in 1896 is stated to have been 2,990 cwt., value ₹1,50,341. The outturn during the last year was 2,295 cwt., valued at ₹83,436. The industry is said to be flourishing. A royalty of 33⅓ per cent. is levied on all Jade-stone extracted in Upper Burma. The right to collect this duty, together with the duty on Amber, is sold annually by auction. The licensee for the year 1892, a Chinaman, purchased the privilege for ₹36,000.

A fine green stone, probably Jadeite or Jasper, is found at Mohgaon in the Sanson tahsil of the Chindwara district of the Central Provinces, and appears to have been worked at some remote period.

118. ***TOTAL INDIAN TRADE.***—The quantity of Jade-stone exported by sea during the year 1893-94 amounted to 2,270 cwt., valued at ₹4,34,650; the trade thus showed a decline of nearly one thousand cwt. on that of the year preceding. But in 1895 the exports were 2,540 cwt., vaued at ₹4,53,062, consigned from Burma to the Straits Settlements. In 1895-96 the exports rose to 4,249 cwt., value ₹5,46,150, and last year (1896-97) to 4,319 cwt., value ₹6,15,120, all from Burma, and consigned mainly to the Straits Settlements.

119. ***False Jade.***—A considerable amount of stone known as False Jade (a form of serpentine) is annually imported into the Panjab from Afghanistan. It is said to be found near Kandahar and to be brought down the Indus to Attock on rafts floated with inflated skins. It is conveyed to Bhera in the Shahpur district, where it is manufactured into knife-handles. The stone is known as Sang-i-Yesham. It is cut by iron saws and water mixed with red sand and pounded emery (corundum, *kurund*).

QUARTZ.

XI.—QUARTZ (*Chakmak*, HIND.).

120. ***OCCURRENCE.***—This mineral, which includes rock-crystal, flint, amethyst, cornelian, agate, bloodstone, chalcedony, chert jasper, onyx, opal, etc., occurs in the Monghyr district of Bengal, and is extremely common in the Hyderabad State.

It is reported that in the neighbourhood of Mangalpura, a place about 4 miles from Pakour in the Sonthal Parganas, crystal is said to have been found which the Pakour Stone Company has sent to an optician at Calcutta for examination as to whether it can be used for lenses, etc. A very useful and profitable industry might be started if this is found to be the case.

On the subject of quartz in the Monghyr district, Messrs. Steven Ambler & Co., of Jamalpur, write as follows:—

"Quartz occurs running in regular veins parallel to the lines of bedding, and throughout the conditions are such as occur in gold-bearing quartz, and such as would warrant an exploration to search for that metal."

In Bombay, quartz occurs within the limits of the Tadkishar, Roswad villages of the Mandvi taluk of the Surat district. Last year there being no demand the contract was not given out to gather the stones.

QUARTZ

This mineral is also found in the Salem district of Madras, as veins of very pure quality, unstained by iron. The Elephant Rock in the lower slopes of Shevaroys is also a magnificent mass of pure white quartz. Gold-bearing quartz occurs in the Kath district of Upper Burma.

Onyx (*Sang-i-Sulemani*, Hind.) are found plentifully in the crystal pits in the Betul district, and there is a band of coarse Onyx near Amerwara in the Chhindwara district.

Agate (*Yamni Akik*, Hind.), cornelian, etc., are found in the beds of the Narbada, Bhima, Godavari and Kistna rivers.

Rock crystal (*Billaur*, Hind.) occurs in the Patna Feudatory State in the Sambalpur district; there are some good specimens in the Nagpur museum.

121. ***INDUSTRIAL USE.***—A small industry in rock-crystal of different colours called "Vallam stones" is carried on at Trichinopoly and in the Palladam taluq of the Coimbatore district of the Madras Presidency, the stones being brought from Vallam in Tanjore. Spectacles and dolls are made out of them. The "Godavari pebbles," which were formerly eagerly sought after, are not now in demand, being most probably out of fashion. In Coorg quartz is used for metalling the roads.

The most important industry in quartz, or rather ***Cornelian*** (*Sang-i-akik*, Hind.), etc., is that which for centuries has existed in the Bombay Presidency, more specially at Cambay; the stones are brought for Rajkot and Rajpipla into Bombay, and a considerable trade is done in them. Mr. Grundy mentions there being four *Akik* quarries at Rajpipla. Broach is also another centre for this industry. Less important centres of lapidary work are those of Jabalpur and Banda.

XII.—RUBY (*Lal Manick*, HIND.; *Kyaukni*, BURM.); SAPPHIRE (*Nilam.*, HIND.); SPINEL and TOURMALINE (*Oktha paya*, BURM.).

RUBY.

122. ***OCCURRENCE.—Ruby.***—The chief Ruby Mines of Upper Burma are situated in the neighbourhood of Mogok and Kyatpyin, in the Ruby Mines district, and are worked by the Burma Ruby Mines Company, Limited, and by native workers. There are four regular mines that give employment to 1,048 persons. The Ruby Mines Company, Limited, have a capital of £300,000, and their outturn in 1895 was put at 56,108 carats, valued at R2,91,357. The expenses of the Company during 1896 were returned at R4,31,892 and the value of rubies yielded at R6,87,537. In 1897 the expenses of the Company amounted to R6,78,934 and the value of rubies found to R8,02,452. The provincial report from Burma for the year 1895 states that "it is known that many rubies have been found at Nanyaseik, but the people who find rubies are not anxious to tell their neighbours or the public. It is said that two rubies worth R5,000 each and one stone worth R10,000 were found, besides a large number of small stones." Rubies are still found occasionally by the alabaster workers of Sagyin.

Spinels and ***Sapphires*** are not intentionally worked for, but are often obtained in association with the rubies. In the Ruby Mines district, Rubies, Spinels, Cat's-eyes, Sapphires, and inferior precious stones are found throughout the Mogaung township, near the villages of Wapyudaung, Kyaukgyi, and Yingan in the eastern and hilly portion of the Twinnge township, also near Sagadaung and Udintaung in the Momeik State. The principal ruby-bearing region, *i.e.*, that of Mogok and Kyatpyin, extends over an area of 66 square miles, but the tract in which the ruby mines are now actually worked is about 45 square miles in extent. The mines are situated in a mountainous tract some 90 miles north-west of Mandalay and 50 miles by road east of Thabeikkyin on the Irrawaddy, at an elevation of 5,000 feet above the sea. The stones occur in small patches in the valleys or between the fissures of the rock, or on the surface soil of the hillsides.

Another ruby tract is that known as the Sagyin Ruby Mines, Mandalay. These are situated in a narrow range of hills rising from the plain of the Irrawaddy valley, 24 miles north of Mandalay, and 8 miles from Madaya. These mines are at present reserved by Government and are not being worked. So again rubies are found in Bhamo in the Nanyaseik stone tract, but the extent of occurrence is not known. The production in 1894 is said to have been 26 tolas, valued at R6,750.

In India itself certain tracts of country are said to contain rubies, such as in the Salem district. The Collector of that district says, however, that garnets are often mistaken for rubies, and that, if there be rubies at all, they are not true rubies, but spinels. Rubies are reported to have been found at Viralimodos and Shoslasingamani. [*Prov. Index* (*Madras*), *page 12*.]

123. ***MINING*** and ***WASHING.***—In the Ruby Mines district the stones are obtained by sinking pits through the superficial soil, until the stone-bearing stratum (*byon*) is reached. This occurs at depths varying from 3 to 20 feet. The earth obtained from these pits is washed through sieves and the stones separated.

The earth from between fissures of rock is similarly treated, except that, of course, pits are not required. The earth is simply dug out of the crevices and washed. The hillside deposits are worked by washing away the surface soil by means of streams of water diverted for that purpose. The stones are then obtained from the surrounding soil by the usual method of washing. Another process of securing rubies, and the one which is now principally employed by the Ruby Mines Company, is that of tunnelling into hills, in order to reach the fissures containing *byon*. The *byon* is dug out, conveyed to a washing station and the rubies separated.

RUBY.

124. It may easily, however, be understood that it must be more difficult to secure remunerative supplies of the stones nowadays than in former years, since the more accessible deposits have been exhausted and the mines have to be abandoned at times, when the water during the monsoon rises in the tunnels. The revenue of the Ruby Mines under the Burmese Kings is said to have been about £12,000 to £15,000 a year.

125. These mines are situated in the Ruby Mines district of Upper Burma, but the term "mines" is almost a misnomer when applied to the excavations from which rubies are extracted. The principal mines are owned by the Burma Ruby Mines Company, Limited, and consist of large pits open to the air and of an average depth of 30 feet. There is practically no tunnelling or working underground. The other ruby mines in the district are worked by native miners. The majority are known as *twinlôn* and consist of holes about 5 feet in diameter which are dug vertically downwards. They are open to the air and are worked by one man below, who extracts the matrix clay, and another man up above, who draws up the clay in a bucket. The rest of the ruby mines are either *myaws* or *lus*. A *myaw* is a seam of clay running as a rule between rocks and invariably exposed to the air and light, from which the clay is either washed by a continuous flow of water or extracted by hand. A *lu* consists of a narrow passage running between rocks often descending 100 feet or more into the bowels of the earth. These native mines are small and extend over a large tract of wild country. They are carried on by hereditary methods. The native industry is, however, far from prosperous. Few stones have been found of late, and there is practically no market for any but stones of the finest water. The fees for ruby licenses for 1896 realized R49,246.

The Burma Ruby Mines Company's mines are situated in a mountainous tract, some 90 miles north-east of Mandalay and 50 miles by road east of Thabeitkyin on the Irrawaddy at an elevation of 5,000 feet above the sea. The mines have been leased to the Company for 14 years from the 1st of November 1896 at a yearly rent of R3,15,000 *plus* a share of the profits.

Women or children are not employed in the ruby mines. The Company pay their native coolies every fifth day at the rate of R1 a day. Native owners pay on a similar principle, but usually arrange for lower rates and to give a share of the profits.

Work is carried on for 10 hours a day. The coolies belong for the most part to a race called Maingtha and come from China. European machinery is used for washing in the Company's mines, which are carefully supervised by highly paid and well-trained Europeans.

126. Myitkyina.—The industry at Nanyaseik is languishing, the specially rich parts having been out last season. Prospectors are waiting to see whether another rich ruby-bearing sediment is struck before taking out licenses.

127. ***Kashmir Sapphires.***—Recent returns are not forthcoming regarding the traffic in sapphires. It is stated that in 1889 these stones, to the value of R15,000, were derived from Kashmir. In a criticism on this remark, discrediting the Review for 1895, it was stated that "only the other day Kashmir State disposed of several lakhs of rupees worth" of sapphires. On representing the statement to the Durbar I have been informed that the valuable collection of stones emanated from a large stock which had been in the possession of the Durbar for many years past. A report from Kashmir on that subject states that a sapphire mine exists in the Padar Jaskar tahsil, which once produced valuable sapphire stones, but its working has long since been abandoned owing to its yielding stones of extremely inferior quality which can scarcely be called sapphires. Mr. W. R. Lawrence (*The Valley of Kashmir, 1897*) speaks of the sapphire mines as having been accidentally discovered in 1882, but as being long since abandoned. Men who were in charge of the sapphire mines in Padar, he tells us, have spoken to me of other valuable minerals. Mr. Mallet tells us that "the rock in which the sapphires were discovered, which was doubtless a crystalline one, as the whole of the Zanskar range is composed of such, appears to have been decomposed and crumbly at the surface, so that the gems could be taken out like potatoes. Further in, the rock was more solid and they could only be extracted with the aid of tools. A very large quantity appears to have been obtained, and the first lots that were brought across the snow are said to have been sold for a mere trifle, owing to the ignorance of the carriers as to their value. Subsequently, however, when the fact that the stones were real sapphires was known, they rose in price to R100 per tola in the rough, and considerably more for really promising pieces."

128. ***Tourmaline***—Is generally Rubellite, good specimens being of a deep crimson but "flesh-red" examples having been found in Pegu. Occasionally also white specimens have been found among the black stones that come from the Shan States. The report furnished by the Government of Burma on the subject of Tourmaline for the year 1895 was as follows—Is found in Maingmaw, Môngmit State, and on the Mobyèchaung between Mogôk and Maingôn. The present state of the industry is bad, due to a fall in market consequent on the late China-Japan war, the Chinese being the only buyers. Outturn during 1896 about 2½ cwt., valued at R57,750. That in 1897 was a little over 5 cwts., the royalty for which was R11,710.

Green tourmaline has also been mentioned as occurring in the Hazaribagh district of Bengal and in the granite dykes traversing gneiss, in the bed of the Cauvery at Seringapatam. Yellow, brown and green tourmaline have been recorded in association with the sapphires of Kashmir and often also present in the rubellite beds of other localities.

129. ***Oriental Emeralds***—Have also been found in the Ruby Mines.

Besides the gem forms of this mineral, India is particularly rich in Corundum, for which see page 45.

MISCELLANEOUS MINERALS.

XIII.—ALUM (*Phitkari*, HIND.). ALUM.

130. ***OCCURRENCE.***—Alum shales occur in several parts of India, but are more particularly worked at Madh in Cutch, at Kalabagh and Kutki in the Panjab, and in Behar. In the Shikarpur district alum is said to be manufactured on the Kirthar range in large quantities and of fair quality. In 1867 the yearly outturn of Cutch alum was estimated at 294 tons, but after that time it fell off. During 1897 about 90 tons of alum were produced in the Cutch State. About 44 tons of alum are made annually at Kalabag and 367 tons at Kutki.

The following process for the manufacture of alum is taken from a report prepared by the Dewan of Cutch :—

The clay dug out from mines one mile eastward of Madh, in the district of Lakhpat, is spread out in beds and for eleven days sprinkled with water taken from small wells sunk in the bed of a river; it then becomes efflorescent (due to the formation of sulphate caused by absorption of oxygen by the pyrites of the clay) and is called *Toori*. The *Toori* is then dissolved in water in iron pans and is boiled, and thus sand and other impurities settle down and the supernatant solution is removed, and with this solution are mixed potash salts obtained from the ashes of cow-dung and town refuse and boiled again. This boiled solution is put in earthen vessels where crystals of alum are formed. These crystals, after being washed with alum water, are dissolved and the solution is boiled again. The crystals of alum are formed after it has been put in earthen vessels and cooled down.

Aluminite occurs in veins in the shale underlying the coal seam at Chittidand in the Salt Range. It was discovered by Dr. Warth in 1886, and was found to consist of sulphate of alumina with traces of iron.

Alum is also found in the Ye-u district of Upper Burma, near Udaung in the Indaing township, but it is not worked.

131. ***TRADE.***—Alum is extensively employed throughout India as a mordant in dyeing, but particulars of the extent of the traffic are not procurable.

XIV.—ANTIMONY (*Surma*, HIND.). ANTIMONY.

132. ***OCCURRENCE.***—Good lodes of stibnite occur at Shigri in Lahoul and also in the Jhelum district of the Panjab. The Jhelum mines are annually leased by the District Forest Officer. Antimony from Bajour sells at thirteen rupees per maund. There is also said to be one mine in pargana Bardi of Rewah in Central India, Its occurrence is rare in the Una district of the Junagadh State, Kathiawar. In the Madras Presidency small quantities are stated to occur in a few fields at *Latipadu* in Gumsur *taluk*, Ganjam district. *Prov. Index of Important Minerals (Madras), page 10.* Antimony is also met with in the Ye-u district of Upper Burma near Udaung in the Indaing township, but it is not worked. But perhaps the most hopeful deposits of antimony are those found in the Kyaukkaung tract of Tenasserim. On May 8th, 1894, Mr. J. H. Herrifield submitted a report on these Tenasserim deposits. "The Kyaukkaung, he says, is divided into two unequal portions of approximately 250 and 37 square miles, respectively. Of these, the smaller western portion belongs to us; the larger eastern to the Siamese." "Mr. Adam, who in antimony is an acknowledged expert, states that he considers the deposits within British territory as of immense value. He was originally brought out from Scotland by the Borneo Company to work their antimony deposits in North Borneo." "I understand from him that the stibnite (the commercial ore of antimony) here, as in Borneo, occurs in irregular deposits of a 'pocketty' nature, often massive and of great value, lining and filling fissures in the limestone in immediate junction with the newer states that overlie the limestone. The method of working is fossicking and poking about in likely localities till a run of payable ore is found, and blasting out the pockets usually in open-casts. Rarely, and then only in the very richest ground, is sinking or driving on any scale attempted." "It is considered cheaper to smelt on the spot and to ship the crude regulus (unrefined pig); the necessary plant can be erected at small cost."

133 ***ECONOMIC USES.***—"The principal commercial use of antimony is in the manufacture of type-metal, for which the demand is enormous and steady; the market is consequently fairly regular and is not subject to the violent fluctuations that have so baneful an effect on tin and other fluctuating staples. Antimony also enters into the manufacture of gong-metal, speculum metal, certain classes of gun-metal bell-metal, and bronze-alloys."

XV.—ASBESTOS "*Shankha palita*, MAR. (=wick made of shells)." ASBESTOS.

134. ***OCCURRENCE.***—There is no recognised industry in collecting and utilising Indian asbestos. The mineral is reported to occur in Afghanistan, the Panjab, Garhwal, Bhopawar (in Central India), in Chutia Nagpur and in Mysore In 1894, 5 maunds, valued at ₹40; in 1895, 6 cwt., valued at ₹48; and in 1896, 6 cwt., valued at ₹48, were procured from Hassan in Mysore. The quantity produced during 1897 was estimated at 5 cwt., value ₹40.

No true asbestos, but a fibrous form of serpentine, is often associated with the magnesite veins of the so-called "Chalk" Hills north of Salem town.

XVI.—BORAX (*Suhágá*, HIND.).

135. ***OCCURRENCE.***—This mineral occurs on the margins of certain lakes in Tibet itself or just within the Panjab frontier of Tibet and in Jummu. In 1855 an attempt was made to develop the trade in native borax. At that time England's imports were 1,100 tons, of which, owing to a monopoly that existed in the trade, only 300 to 600 tons were produced in India. An enquiry was then set on foot, which, although resulting in many interesting facts on the subject being made known, was not successful in materially improving the trade.

(*1st*) ***Puga Borax.***—The Pugá borax is obtained from the small valley of that name. The valley was visited by Captain W. C. Hay, who estimated the entire produce at 20,000 *kutcha* maunds (1 *kutcha* maund = 32lb). Most of it goes *viâ* Rámpúr to the lower hills about Subáthu, Bhaji, etc., where in winter it is refined by the carriers, and thus becomes the borax of commerce. At Jagadri in the plains there are extensive refineries that receive nearly all the Pugá borax. The article is then carried down the rivers Jumna and Ganges, but it is doubtful if it reaches England in any quantity. Borax of a superior quality, in fact nearly pure, is found near Rudokh—a portion of Tibet subject to China. It is also believed that if the jealousy of the sellers could be broken down, other borax-yielding districts would be discovered.

(*2nd*) ***The region of Indian Borax*** may be said to commence in the west, at the valley of Pugá in Ladak, passing east to the lakes of Rudokh. Along this tract of country and extending considerably to the east, a chain of salt lakes occurs, most of which, in all probability, afford borax. In a report to hand it is stated that during 1897 Kashmir State produced 557 maunds of superior borax and 40 maunds of inferior at R679 and R33, respectively. The value of the first kind was R1-5 per maund, and that of the second 13 annas 3 pies. In 1896 the price of borax was R2-13-3 per maund.

To the south of Lhasa, at the Yamdok Cho, borax is known to have been collected from time immemorial. In Tartary holes are dug in the arid soil of many parts of the deserts; within these, native borax collects and is periodically gathered.

PURIFICATION of BORAX.—"The borax is pounded and placed in shallow tubes, and then covered with water to the extent of a few inches; to this is added a solution of about two pounds of lime (dissolved in two parts of water) for every ten maunds (820 pounds) of borax, and the whole mass is well stirred every six hours. Next day it is drained on sieves of cloth, and after this is again dissolved in $2\frac{1}{2}$ times its weight of boiling water, and about sixteen pounds of lime added for the above quantity. It is then filtered, evaporation takes place, and subsequently it is crystallized in funnel-shaped vessels, usually of *konsa*, an alloy of copper and zinc or lead. The loss in weight is about 20 per cent."

136. ***TRADE in BORAX.***—Borax is chiefly imported into India through the North-West and the Panjab Himalaya. The following statement shows the principal ***Imports*** for the years 1883-84, and 1893-94 to 1869-97 :—

Imports from Tibet into the North-West Provinces.

YEAR.	Weight in cwt.	R
1883-84	24,873	3,37,938
1893-94	14,850	1,57,548
1894-95	13,710	1,72,107
1895-96	13,552	2,62,480
1896-97	14,239	1,74,653

Imports from Ladak and Tibet into the Panjab.

YEAR.		Weight in cwt.	R
1883-84	Ladak	6,676	73,081
	Tibet	2,452	20,028
	TOTAL	9,129	93,109
1893-94	Ladak	1,148	10,588
	Tibet	968	7,908
	TOTAL	2,116	18,496
1894-95	Ladak	1,327	14,197
	Tibet	978	10,648
	TOTAL	2,305	24,845
1895-96	Ladak	1,935	21,072
	Tibet	886	8,435
	TOTAL	2,821	29,507
1896-97	Ladak	1,967	18,280
	Tibet	778	7,420
	TOTAL	2,745	25,700

EXPORTS.—In India the trade in borax, judging by the returns available, may be said to be decreasing; the figures returned of the exports of this article to foreign countries also show a marked decline. But the decline may be taken as a natural consequence of the discovery of extensive beds of borax in America, and of the greatly extended trade in the artificially prepared article. It has, however, been inferred that, although India cannot hope to compete in the foreign trade, her trans-frontier imports will always be of importance, owing to the considerable internal consumption. The article is inferior to that of Tuscany or California, and the transit charges across the Himálaya to the coast are prohibitive.

Analysis of the Foreign Export Trade in Borax for 1896-97 as compared with that for 1893-94 and 1883-84.

Provinces from which exported.	1883-84.		1893-94.		1896-97.	
	Cwt.	₹	Cwt.	₹	Cwt.	₹
Bengal	16,095	3,54,699	7,017	1,20,323	5,304	89,934
Bombay	121	3,819	213	5,148	212	4,554
Madras	...	...	...	...	...	...
TOTAL	16,216	3,58,518	7,230	1,25,471	5,516	94,488

Countries to which exported.	1883-84.		1893-94.		1896-97.	
	Cwt.	₹	Cwt.	₹	Cwt.	₹
United Kingdom	14,134	2,92,585	4,595	74,616	1,549	21,555
Arabia	38	1,130	26	667	42	947
Hongkong	1,713	56,424	2,086	40,171	3,304	62,024
Straits Settlements	258	6,147	319	5,375	450	6,329
Turkey in Asia	36	1,057	152	3,666	134	2,812
Other Countries	37	1,175	52	973	37	821
TOTAL	16,216	3,58,518	7,230	1,25,471	5,516	94,488

XVII.—COPPER ORES (*Támba, Támá*, HIND ; *Kyeni*, BURM.).

137. ***OCCURRENCE.***—These ores are widely distributed. They occur in Singbhum and Dalbhum, and are said to be found also in the Banka division of the Bhagalpur district, Bengal; but mines in the latter locality do not appear to have ever been opened. Azurite and other carbonates of copper are found at Kakwara in South Bhagalpur.

Under the direction of Hyder Ali, excavations were made on the lower ridge of the copper mountain range five or six miles west of Bellary, but they were speedily given up. Lieutenant Newbold, in 1840, also noticed similar copper ores in the Cuddapah, Dharwar, and Nellore districts. There were seven mines in the latter district and were known to exist as far back as 1564. The ores contained from 31·7 to 68·5 per cent. of hydrated carbonate of copper and from the analysis of specimens of slags found near the old smelting furnaces, it would seem that the rude processes of extraction used in olden times were effectual in completely separating the metal. Old mines are also stated to exist in the Kistna and Kurnool districts. In Trichinopoly traces of copper have been found—*Provincial Index (Madras), pages 10, 11.*

Copper ores occur in several places in the Chanda district of the Central Provinces, and there are at least three places in the Mul tahsil, where mines were worked in ancient times. These ores are also found near Birman in the Narsinghpur district and Gosalpur and Khetola in the Jabalpur district, but in the latter place it has not been worked as an industry. In Rajputana, copper ores are found in several of the independent States, and in the British district of Ajmir, where mining was practised on a large scale, but is now almost extinct. For instance, there is a hillock about 6 miles east of Puri called Punagar-ki-Bhákri, where sulphide of copper is found. There is said to be one copper mine in Rewah State, Central India. Unsuccessful attempts have been made to work the copper ores of Kumaon, Garhwal, the Western Duars, and the Darjeeling districts. Copper mines are said to exist in Hyderabad, but valuable ores in any quantity have not as yet been discovered.

Copper ores are found in the Tagaung Sub-division of the Ruby Mines district in the hills east of Kyanhuyah. The industry is not appreciable. There are workings forty years old, and it is reported that the Chinese once had a concession from Mindon Min. Copper also occurs in the Mantaung and Anahta Circles of the Katha district, but was not worked during the year.

COPPER.

138. *OUTTURN IN BENGAL.*—Statistics regarding production of copper in 1896 are not available The outturn in Bengal during the year 1891 was estimated at 2,500 tons, valued at R1,32,500. In 1888 218 tons of refined copper were said to have been turned out. The industry of copper smelting has been dormant in India for many years, and may be said to have revived to any extent in two localities in Bengal only, *viz.*, Baragunda in Singhbhum and in Dalbhum, where a company is said to be working the ore.

Rajputana.—Jaipur.—Copper ores are found in mines in the hills near the villages of Singhana, Khetri, Babai and Nagore in the shape of stones. These stones are broken to pieces and ground to a powder which is mixed with dung, dried and then melted in a fire in a vessel called a *Nandri*, and then it is cleansed to obtain pure copper which is used in making coin pieces. These mines are very deep and difficult to work in.

During 1897, 32½ tons of ore valued at R275 were produced in Khetri.

139. *TRADE.*—Some idea of the value to India of copper mines may be learned from the returns of the foreign trade. Last year India imported 240,895 cwt. of copper, valued at R1,07,54,141. The major portion (143,519 cwt.) came from the United Kingdom; Belgium being next in importance (26,429 cwt.) and after that Hongkong (24,240 cwt.). By far the largest portion of these imports usually goes to Bombay (105,712 cwt.). The trade fluctuates very considerably, the transactions of last year (1896-97) were the lowest during the past five years, and the highest of that term were in 1893-94, *viz.*, 591,109 cwt.

Brass.

BRASS.—The total imports in brass in 1897 were 9,827 cwt., valued at R5,78,702.

The following information on Bengal manufactures has been supplied by the Director of Land Records and Agriculture :—

Bengal.

BURDWAN—Brass, bell-metal and hardware articles are manufactured in all the districts of this division. Two factories in Burdwan have been closed. In Kanchannagar, a suburb of the town of Burdwan, knives and scissors of the value of R3,604 were manufactured during the year. The business is declining in Hooghly, the cheaper enamelled ware from Europe gradually replacing the native brass utensils. But it is flourishing in the town of Kharar in Midnapur, where it is said to give employment to between four and five thousand persons daily.

PRESIDENCY DIVISION.—The brass foundry at Moheshganj in the district of Nadia (owned by a zamindar trained in England) turns out screws and other requisites for indigo factories. Brass materials are manufactured at Navadwipa, Jibnagar, Dharmadaha and Motiyari in Nadia and also in some parts of Jessore. Bell-metal and brass materials of superior kind are largely made in Khagra, Berhampur, Kundi and Baranagar in the district of Murshidabad. Brass padlocks (resembling Chubb's locks) are made in almost all parts of the Jangipur sub-division in the district of Murshidabad.

RAJSHAYE.—Brass and bell-metal utensils are manufactured at Kalam and Boodhpara in the Natore sub-division in the district of Rajshaye, in Panchagurh, in Jalpaiguri, and in the district of Pabna, for exportation to other districts.

DACCA.—Brass utensils, including brass plates in imitation of China plates, are made at Khagmari in the Tangail sub-division and are in great demand. They are also made in the Faridpur district to some extent.

CHITTAGONG.—Brass utensils are manufactured in this division, as well as rough agricultural tools.

ORISSA.—Brass utensils and ornaments as well as bell metal utensils are manufactured in this division.

PATNA.—Brass, bell-metal and copper utensils are made in this division. The bell-metal utensils are chiefly made at Sewan in the district of Saran.

BHAGALPUR.—Brass articles are manufactured in the district of Maldah.

CHOTA NAGPUR.—Brass and bell-metal utensils and ornaments used by the common people are manufactured at Chatra in Hazaribagh, at Lohardaga, Palkote, Ramgari and Jelia in Lohardaga and in tracts of the Chas thana, in the town of Purulia in Manbhum and in parts of Singhbhum. Brass plates called "Chippig" are largely manufactured in the Lohardaga district for local use and for exportation to a some extent to the neighbouring districts and to the Political States of Jashpur and Sirguja.

North-West Provinces.

NORTH-WEST PROVINCES.—The following information regarding the brass and iron foundries in the North-West Provinces and Oudh is quoted from official sources :—

During the calendar year 1896 two foundries (the N.-W. Foundry and Frizoni & Co.'s Engineering Works) were worked at Allahabad, and one (the Canal Foundry Workshops) at Rurki. The quantity and value of the outturn were as under :—

	Quantity. Mds.	Value. R
N. W. Foundry	8,121	...
Frizoni & Co.'s Engineering Works	...	3,00,000
Canal Foundry Workshops at Rurki	...	3,83,037

The chief centres of brass and copper manufacture in the North-West Provinces and Oudh are Benares, Moradabad, Lucknow, Mirzapur, Agra and perhaps Farukhabad. Benares and Mirzapur may be said to be the centres of ornamental and useful Hindu brass and copper work, while Moradabad,

Lucknow and Farukhabad fulfil the same purpose for the Musalman section of the community. Agra has been of late years devoting itself to the reproduction or adaptation of vessels and articles of European shape and type.

Mixed or ***Yellow Metal*** for sheathing purposes constitutes a very distinct item in these imports, *viz.*, 226,804 cwt. in 1893-94, 179,261 cwt. in 1894-95, 226,716 cwt. in 1895-96, and 109,554 cwt. in 1896-97.

XVIII.—CORUNDUM (*Kurund*, HIND.).

140. ***OCCURRENCE.***—Corundum and Emery stone (Oxide of Aluminium) is very freely distributed among the crystalline rocks of Southern India, such as in the Travancore State, the Mysore State, Hyderabad (Kazipet), and in the districts of Coimbatore, Salem, Anantapur, North Arcot and South Canara of the Madras Presidency. Mr. C. S. Middlemiss of the Geological Survey has published several reports on the Corundum localities of Salem. These have already been noticed in previo us reviews, but may be consulted in the *Agricultural Ledger* No. 16 of 1896 and in the Records of the Geological Survey, Volumes XXIX, Pt. 2, pp. 39-50, and XXX, Pt. 3, pp. 118-122.

The following interesting remarks on the occurrence of Corundum in the rocks of Sivamalai in the Coimbatore district appear in Mr. Holland's report published by the Geological Survey, 1898 :—"But the most important feature in connection with the discovery of elæolite-syenite is the bearing it has on the origin of the corundum associated with it. The corundum is found in a felspar rock which invades the elæolite-syenite in the neighbourhood of Sivamalai, and is worked by the villagers at or near the junction of the two rocks ; as the elæolite-syenites contain a higher percentage of alumina than any other known igneous rocks, it is natural to look to it as a source of the excess of alumina which has crystallized out near the junction as pure corundum. The observation is all the more interesting because corundum, precisely similar in crystallographic characters to that near Sivamalai, has been prepared artificially by simple fusion of the mineral elæolite."

An analysis of the elæolite under reference afforded the following composition :—

Silica	43·35
Alumina	34·32
Iron oxide	1·02
Lime	·82
Potash	5·52
Soda	14·62
Loss on ignition	·75
	100·40

The preliminary investigation of the corundum-bearing rock near Palakod has been closed, and a report giving full descriptions of the mineral and valuations of experts will be published during the year.

141. ***OUTTURN.***—The mines in Salem and South Canara are not worked, though they m y be said to have great possibilities. Three tons are reported to have been quarried during 1894, 13 tons in 1895, 20 tons in 1896 and 203 tons in 1897 in the Madras Presidency. In Anantapur the industry is reported to be active during the rainy season, specially is one taluq. The mineral is of a sea-green colour. Local price R5 to R7 per 100 seers by measure. (*Prov. Index, Madras*, p. 11.) In Coimbatore and North Arcot, the right of collecting has been leased out for R1,625 per annum and for R2-4 per Indian maund, respectively, from the year 1893. An immense deposit exists near Pipra and Kodopani in South Rewah. During 1897, 2,155 cwt., valued at R3,170, is reported to have been obtained from two mines in *pargana* Bardi. There is a mine at Mouza, which is said to have realised R547 in 1894. In the Nizam's Dominions corundum is found in the Khamameh and Nagar Kurnool districts, and some fine specimens have been discovered near the Kazipet Station of the Nizam's Guaranteed State Railway. At Yelgandal, it is stated, corundum was worked during 1895, the produce being valued at R21-4. In the Mysore State leases are sold by public auction.

The estimates of Mysore production during the years 1895, 1896 and 1897 were :—

	1895.		1896.		1897.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	R	Cwt.	R	Cwt.	R
Bangal re	Not ascertained.	321	Not ascertained.	400	...	...
Kolar	...	...	...	...	...	...
Tumkur	560	2,133	179	722	76	228
Hassan	210	630	180	540	172	343
Chitaldrug	2	8	2	8	2	8
TOTAL	772 *	3,092	361 *	1,670	250	579

* The total involves an error (relative to value) through the yield of Bangalore not having been returned.

CORUNDUM

142. *USES.*—"The uses to which corundum is put, when powdered, are well known. The consumption in India must be considerable, though possibly it was larger formerly than it is at present, as the trade of the native armourer is perhaps not so active as it used to be. A large quantity is employed by the cutters and polishers of stones, both precious and ornamental, who are to be found scattered throughout India. To what extent Indian corundum is used in European countries is not very well known, but it could doubtless be applied to many of the purposes for which the emery of the Greek islands is now used, and which, owing to a monopoly at one time, reached the high price of ₹30 a ton in London." (Mr. Mallett in *Manual of Geology of India, Part III, page 422*, IV.) It is possible also to manufacture aluminium from corundum, and in that direction a great future may be in store for the Indian fields. Domestic articles made from aluminium have been recently introduced in Madras.

The manufacture of a hard substance named "carborundum" has recently been instituted in America, and it is claimed for the mineral that it may supersede emery. It is made by heating together carbon in the form of coke and good glass sand, the heat employed being that of the electric furnace. The works which are situated in Niagara are said to have turned out in 1896, 1,200,000lb or 535 tons of crystallised carborundum.

Enquiry has been made through the Imperial Institute by an English Firm for samples of corundum and garnet sand suitable as an abrading agent. Specimens have been forwarded by the office of the Reporter on Economic Products. Some of these were found to be more or less suitable for the purpose required.

GYPSUM.

XIX.—GYPSUM (*Kulnar; Khariyā mitti, Gach*, HIND.).

143. *OCCURRENCE.*—Gypsum occurs in the following localities:—(1) Trichinopoly, Nellore and Chingleput, Madras; (2) Cutch and Kirtha range of Sind, Bombay Presidency; (3) near Nagore in the Jodhpur State, Rajputana; (4) Central India (Bijawar and Baraundha); (5) Bannu, Kohat, and the Salt Range, Panjab; (6) Kumaon and Garhwal, North-West Provinces; and (7) in the Pagan subdivision of Myingyan; it is not worked in Burma, as it is of little or no value.

The mines in the Trichinopoly district are not worked, and the quality of the gypsum found in the neighbourhood of Nagore is not as a general rule good, but in the excavation of a well in the Falod *pargana* some of the finest specimens were found. They were, however, at too great a depth to be workable. The mines in the neighbourhood of Nagore are worked in the following manner:—Depressions where the gypsum is found are cleared of the surface sand and earth, and trenches are dug, from which the mineral is removed in the form of clods. The trenches being left untouched for two or three years and exposed to rain, fill up with gypsum, which is again removed. At present little gypsum is extracted, but better results are now hoped for since the opening of the railway to Nagore, which will cheapen the carriage. In Nellore and Chingleput gypsum is met with, as crystals of selenite. The Nellore crystals are stated to be of finer quality and better colour than those of Madras. *Prov. Index (Madras), p. 13.*

The salt in the Salt Range, Panjab, is overlaid by a deposit of gypsum some 15 or 20 feet thick—enough to supply the whole world.

144. *OUTTURN.*—The production in the Rajputana States during 1894 was estimated at 3,169 tons valued at ₹2,034; for 1895 at 6,609 tons, valued at ₹3,478; in 1896 at 7,428 tons, valued at ₹3,904-4-0; and in 1897 at 8,035 tons, valued at ₹4,300. In Bundelkhand the production in 1894 came to 118 tons, but in 1895 the production for the whole of Central India was given as 99 tons, valued at ₹402. An outturn of 45 tons, value ₹162, was reported for 1896 from Bijawar, Bundelkhand, and in 1897 it is given as 23 tons, valued at ₹30. During 1896, 12 tons is stated to have been produced in the Madras Presidency, the value of which is not mentioned.

145. *USES.*—Gypsum is not much utilised in India, though in many of the above-mentioned localities it may be had of good quality. When burnt, it is reduced to anhydrous sulphate of lime or "Plaster of Paris", and may in this state be used as a cement when it is not much exposed to atmospheric changes. In Bombay it sells at about ₹2 per hundredweight. It is a valuable manure, especially for leguminous crops, in the ash of which it is an important constituent.

LEAD.

XX.—LEAD ORES (*Sisa*, HIND.; *Kè*, BURM.).

146. *OCCURRENCE.—Madras.*—Extensive old workings occur at Guzalpali in the Kurnool district of Madras, but the mines are not worked at present. The Jungamanipenta lead mines in the Cuddapah district were worked after the Mogul invasion of South India. Kistna, Bellary, and Salem are recorded to have lead mines, now long deserted. In Salem a large quartz lode occurs 3 miles east of Morupur Railway Station; this proved, on being deeply prospected in 1882, to contain nests of galena. *Prov. Index (Madras), p. 14.*

Bengal.—In Bengal deposits of galena are met with in the Bhagalpur district, and have been more or less worked at various times. Others are found at Dhadká in Manbhum; in the Monghyr district lead ore is met with in the stream beds of the Kharakpur hills near Gungta in the estate of the Maharajah Darbhanga. This ore resembles *kankar* (*see page 61*) in appearance, the outer surface being carbonated,

and it evidently has its origin from a bed or vein of sulphide, which has not, however, been searched for and located. Some years ago a European entered into an agreement with the proprietor of the Lachmipur estates in the Banka sub-division of the Bhagalpur district, Bengal, and commenced mining operations, but very soon discontinued his explorations.

Central Provinces.—In the Central Provinces lead ores have been found in the Sambalpur and Raipur districts.

Bombay.—In the Bombay Presidency lead ores are found in the Panch Mahal and Narakot (Rewa-kantha) near the iron ores.

Panjab.—Lead mines and works were started many years ago near Subathu in the Simla district, and mines have for long been worked by natives in Sirmur.

Central India.—There are said to be two lead mines, one in Urgarh and the other in Kursa (Rewah State).

Rajputana.—Galena has been extracted in Ajmere, Alwar, Jhabua, and Udaipur, etc. In Marwar near Eriupura Road there is a schistose which contains lead. It is believed that traces of silver to a workable extent may be found in it.

Burma.—There are old lead mines in the Mandalay and Katha districts of Upper Burma, but they are not now worked. A mine in Bawzaing, Southern Shan States, is, however, worked by a Chinaman to whom a five years' lease of 4½ square miles was granted in 1892. In November 1897 another lease of $2\frac{1}{10}$ acres in these States was granted for a period of 5 years to Maung Kya Twet Ngwegunhum. Royalty at the rate of 7½ per cent. on the sole value of the lead is to be paid.

Lead mining in India may, therefore, be said to be at present practically in a dormant condition.

147. ***TRADE.***—The foreign imports are fairly extensive; last year they were 123,434 cwt., valued at ₹16,93,577. On that amount the major portion is returned under "Sheets for tea chests," *viz.*, 83,236 cwt., valued at ₹11,85,238, the bulk of which naturally was received by Calcutta.

XXI.—MAGNESIA MINERALS (*Zahr mohra; fulsát*, HIND.).

148. The very extensive occurrence of magnesite in the chalk hills close to Salem, in the Madras Presidency, is noteworthy, but this valuable supply is not at present utilised. Dr. Heyne was the first to discover these formations early in this century, and Dr. Macleod was the first to bring to notice the useful properties of the mineral in the composition of hydraulic cements, for which he was awarded the sum of ₹3,000 by the East India Company. Magnesia was subsequently found in large quantities near Trichinopoly on the banks of the Cauvery. The reader should consult the recent Report by Mr. C. S. Middlemiss, of the Geological Survey, with regard to the present position of magnesite in the Salem district, and published in the *Agricultural Ledger* No. 15 of 1896.

Veins of this mineral are also met with in Arakan and in Manipur, as also traces near Mussoorie. Near the Happy Valley in the latter district, three outcrops, four feet thick,—a mixture of fine white powder and of coarser rock—have been discovered. Twenty per cent. of the coarse rock obtained contained nearly equal quantities of magnesium carbonate and calcium carbonate. The white powder amounted to 80 per cent., and by analysis was found to be composed as follows:—Silica, etc., 6; Alumina, ferric oxide, etc., 3; Calcium carbonate, 7; Magnesium carbonate, 84; Total 100.

XXII.—MANGANESE ORES (*Kolsa-ka-pathar*, HIND.; *Thannetkyauk*, BURM.).

149. ***OCCURRENCE.***—The following extracts from a paper on "Indian Manganese Ores" recently read before the Iron and Steel Institute by Mr. H. G. Turner will best give the position of the industry in this mineral:—

Mr. Turner pointed out that India was one of the sources of supply of manganese ore. It was, however, only recently that manganese ore had been sent to Europe and also to the United States. About five years ago attention was directed to a small deposit of this ore in the Vizagapatam district of the Madras Presidency, and further exploration brought to light the occurrence of the mineral in large quantities throughout a considerable extent of country. The ore outcropped in various places over, so far as was known, an area of 100 square miles, situated within the extensive territories of His Highness the Maharaja of Vizianagram, a well-known and distinguished Hindoo nobleman. Topographically, the manganiferous area was part of the littoral tract of country which stretched between the range of mountains known as the Eastern Ghâts and the Bay of Bengal. It was somewhere about 500 miles north of the city of Madras, and about the same distance south of Calcutta. The East Coast Railway passed over the area, and two good roadsteads were within 40 and 60 miles, respectively. Vizagapatam, the latter port, was touched by the railway, and all the ore exported was sent by rail to, and shipped from, that port. Unlike many manganese deposits in other parts of the world, these Indian deposits of ore occurred not in a mountainous tract, but in a plain country, through which the railway passed on a gradient which rose but little above sea-level Being densely populated, every cultivable acre thereof was under the plough. Agriculture was the only local industry, and there was a large surplus population from which abundance of labour was procurable in all months of the year. Even during tilling time (in June and July) and in harvest time December and part of January), when the supply of coolies diminished, there were always sufficient hands to keep the mines going. The climate was perfectly healthy throughout the year, and suitable for Europeans.

MANGANESE.

Madras.

The outcrops of manganese ore occurred either in the form of mounds, of low hills, or as isolated blocks, while in some places the soil, impregnated with black oxide of manganese, gave indications of ore beneath the surface. The first mound discovered was within a few hundred yards of the railway Unaware of its nature and value, the railway contractors were breaking up the boulders of manganese rock for ballast. This mound consisted of about 60 acres of black manganese rock and boulders intermixed with an alluvium of decomposed gneiss. Further investigation showed it to be the butt-end of a deposit of vein-like masses of ore and detached boulders imbedded in detritus of country rock. This deposit being about 2½ miles in length, comprises an area of 660 acres. There was probably a spine, or the remains of a spine, of hard ore all along this length. The detached blocks of ore exhibited marks of being water-worn, and these occurred in all sizes, from a pebble up to great boulders of several hundredweight. These broken fragments were disseminated throughout the soil—sometimes so sparsely as to make quarrying unprofitable, at other places in drifts and beds several feet thick.

During 1896 some 30,000 tons of ore had been sold, and were being shipped from this mine by the owners, the Vizianagram Mining Company. The high-class ore went to the ferro-manganese makers and the lower class to the basic furnaces, while the pyrolusite was taken by chemical works.

Recently other deposits had been discovered, notably one at a village called Garbham, some ten miles from the Kodur mine. An experienced engineer from a well-known London firm had visited this deposit, and reported that it probably contained 1,500,000 tons of ore down to water-level, *i.e.*, above the water level of the country. This deposit consisted of a mass of ore some 80 feet high, half a mile long, and 100 yards wide, with two small outliers. Works were being started in this remarkable hill. The whole mass appeared to consist of great slabs of manganese ore of various quality. Shipments thereof were being made based on samples which had been approved by brokers and consumers. It was proposed to lay down a tramway line to facilitate the transport of the ore to the railway. The Vizianagram Mining Company were in treaty for the purchase of the property.

The general character of the ore was hard, compact, and well suited for use in the blast furnace. The mechanical condition of the rich ore, coupled with its very low content of silica, admitted of its being mixed to advantage with the lower phosphatic ores from Brazil and Chili. Thus, the blending of the Indian phosphatic ores, free from silica, with the ore supplied from other sources, enabled the furnace-masters to effect an economy in the cost of the burthen varying from 5 to 10 per cent. An additional economy arose from the fact that the Indian mineral carried sufficient iron for the manufacture of ordinary qualities of ferro-manganese, and contained more phosphorus than the Brazil and Chili ores; its behaviour in the furnace left nothing to be desired. It was comparatively free from silica (averaging about 3 per cent.); it existed in enormous quantities, and was cheap to work, to rail, and to ship. Considerable progress was noticeable in the demand for the ore, and there was every probability of a large and valuable trade being established within a short period of time.

Mr. Turner gave the following typical analyses of ore sold to various consumers in England, on the Continent, and in America :—

—	I.	II.	III.	IV.	V.
Moisture	1·10	1·30	1·65	1·80	1·48
Manganese	48·65	46·15	50·35	45·08	47·09
Iron	7·10	10·35	6·38	13·23	10·80
Phosphorus	0·12	0·21	0·24	0·27	0·26
Silica	2·23	3·20	3·21	4·60	2·45

Note.—I, Kodur ore; II, Kodur ore; III, Garbham ore; IV, Garbham ore; V, Garbham ore cargo test.

This ore is reported to occur also in Bellary, Kurnool and Nilgiri districts and the Pudukkotai State of the Madras Presidency.

Manganese ores are found also in the trap rocks of Belgaum, Dharwar, and Ratnagiri districts in the Bombay Presidency. Jhabua in Central India is also said to possess valuable supplies of this mineral, which are not as yet employed industrially. But the most famous, and in some respects perhaps the most hopeful locality for future development is Gosalpur in the Jabalpur district of the Central Provinces. It has been reported that a lease has been granted of these mines to a European firm, but in the returns of 1895 no mention is made of any progress. The Review for 1895 stated that the ore was extracted by labourers who wash it in the Hiran stream before exportation.

Burma.

An extensive bed of ore—thought to be of several square miles in extent—has been reported to exist in Lower Burma. It unites three localities: the bank of the Thugco stream, the bank of the Thirabuen and the Great Tenasserim river. The ores are stated to consist of black and grey oxides and wad.

150. ***OUTTURN.***—During the year 1895 the Madras Presidency is said to have produced 25,816 tons, and during 1896, 56,869 tons. The outturn for 1897 is reported to be 73,680 tons. It will be seen from the

following statement that the published exports from Madras for 1895-96 came to 22,758 tons and for 1896-97 to 47,330 tons :— MANGANESE.

Exports of Manganese Ore from British India by Sea to other Countries during the past five years.

From		COUNTRIES TO WHICH EXPORTED.							
		UNITED KINGDOM.		FRANCE.		UNITED STATES.		TOTAL.	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		Cwt.	₹	Cwt.	₹	Cwt.	₹	Cwt.	₹
Madras	1892-93	20,000	8,000	...	...	...	...	20,000	8,000
	1893-94	33,000	13,200	...	...	...	...	33,000	13,200
	1894-95	122,320	48,928	6,000	2,400	...	...	128,320	51,328
	1895-96	387,160	1,54,864	...	...	68,000	27,200	455,160	1,82,064
	1896-97	852,600	3,41,040	...	...	94,000	37,600	946,600	3,78,640

So far as is known no other province than Madras exports this mineral. The trade, as already remarked, is a new one and one that will be seen to have made remarkable progress during the past five years. The increasing outturns are due to the success that has attended the operations of the Vizianagram Mining Company.

XXIII.—MICA (*Abrak*, HIND. ; *Lagyi*, BURM.). MICA.

151. ***OCCURRENCE.—Bengal.***—Commercially Mica is sometimes spoken of in India as Talc, though mica and talc are different minerals. The former is elastic and cleavable into sheets, the latter flexible and seldom in sheets or scales (*Conf. with Soapstone, p. 52.*) Mica lands belong either to the Forest Department or to the Zemindars, for which leases are taken out by the miners. They are leased out at a fixed royalty of ₹50 an acre. The miner has to ascertain for himself, by excavation, the kind of stone that lies underground. Mica lies within huge blocks of stones which have to be blasted before the mineral is reached. A cheap gunpowder manufactured locally is used for this purpose. After the upper layers of the blocks, wich are usually cracked, have been removed, the lower layers of good quality are prepared for export. The largest size, *viz.*, 25 inches long and 5 inches wide is known as No. 1. Mica is cut into sizes by skilled men with an instrument called *hasya*. Unstained good ruby-coloured mica realises as much as ₹800 per maund. There are 280 mines now in existence in Bengal. The main region of mica production is in the Hazaribagh district of Bengal where the mines in the Koderma Government estates and in the Gadis-Gawan are being utilised. It is also found in the Gaya, Monghyr, and Bhagalpur districts of the same province, and three mines, *viz.*, the Sapahi, the Singar and the Chatkari in the Gaya district are now worked and four in Monghyr. The Singar mine produces white mica and has been worked for 30 years. The ruby-coloured mica of Bengal is held in great estimation. The Conservator of Forests, Bengal, in his Progress Report for 1895-96, Appendix B, offers some useful information on the subject of the mica mines that fall under his control.

Madras.—" Mining for this mineral may be said to have commenced in the Nellore district in 1887 ; the work was carried on in a desultory way until 1890. That year, owing to the successful results obtained from one mine which had been worked since 1888, numerous plots were purchased for mining at fancy prices; many of these were abandoned as unprofitable. In 1890, as the result of inspection of the mica mines by Dr. Warth, a suggestion was made to impose a royalty upon mica exported from Madras. It was, however, resolved to await further development of the industry. The work languished until 1895. In the year under report the applications for mining leases rose to 270, and operations, which hitherto had been confined to the Rapur taluq, extended generally to other taluqs. The levy of a royalty upon the outturn is again under consideration."—(*Annual Report, Madras Forest Department, 1895-96*, page 46, para. 75). " The Madras Index of Local Minerals," written by Dr. King and Mr. Middlemiss, gives useful particulars regarding the mica found in South India. Though the mineral seldom occurs in large enough plates to be of commercial value for minute work and spangles, good enough material can be obtained in most districts as in Bellary, Coimbatore, Salem, Trichinopoly, and Travancore.

Sind and Rajputana.—Mica is found in the Shabhabunda taluq of the Karachi district of Sind ; in the Kishengarh State and in Godwar in the Marwar State of Rajputana ; and near Jambagaun, 20 miles west of Chota Udaipur in Rewakantha. The Kishengarh mica is said to be not very pure, and to occur in pieces not large enough for trade ; during 1896 the mines were closed.

Bombay.—Mica is reported to be found on Girnar Mount, in the Junagadh State of Kathiawar. Its occurrence is rare.

Nizam's Dominions.—The Hyderabad mines have been considerably worked by the Hyderabad (Deccan) Company, but the variety of mica chiefly met with is biotite, and is generally so largely impregnated with iron as to be of inferior commercial value.

Mysore.—Mica occurs also in the Mysore State and in Coorg. In the latter province mica-bearing pegmatites have recently been investigated by Mr. Holland of the Geological Survey. There has been found

MICA.

a large quantity of mica, easily accessible and likely to prove of considerable commercial value. Samples sent to London for valuation have been well reported upon, and the mineral, it is said, will command good prices in the home market.

Burma.—Mica is found in the Ruby Mines district near Chaukkyi in the Twingé township, and in various parts of Mogok township. It is reported that no persons are employed in working the mineral at present.

152. *OUTTURN.*—The estimated production during 1894 was 180 tons, valued at ₹1,45,388, but in 1895 the output came to 375·9 tons, valued at ₹3,16,614, and in 1896 to 311·2 tons, valued at ₹3,42,470. The outturn during 1897 is reported to be 445 tons, value ₹1,99,003. These figures compared with the last year's production show an increase of 44·16 per cent., but they show a decrease in value of 41·89 per cent. In the Review for 1894 it was pointed out that the declared production for some years past had rarely been more than one-half the quantities shown to be exported. The figures of production in 1895 were considerably in excess of the demands of the foreign trade and would thus appear to be very possibly correct.

The total number of persons employed on the Hazaribagh mica mines (or rather quarries) has been returned at 5,587. Mr. James Grundy (*Report of the Inspection of Mines in India, 1896*) enumerates these mines. He shows 271 in the Hazaribagh district of Chutia Nagpur, Bengal. The largest owners of these would appear to be Messrs. F. F. Chrestein & Co. of Tisri *viâ* Bhurai, with 118 mines; Mr. W. R. Macdonald of Koderma with 33 mines; Babu Raj Krishna Sahana of Koderma with 46 mines; Mr. W. D. Clyburn of Koderma with 19 mines; Mr. A. M. Gow Smith with 11 mines; Mr. C. A. Dickson of Koderma with 8 mines; Mr. W. Noble with 7 mines; and several other smaller owners with each one or two mines. In the Monghyr district of Bengal Mr. Grundy shows 6 mines, of which the following may be mentioned:—The New Indian Mica Company; Messrs. F. F. Chrestein & Co.; and Mr. C. W. F. Buckland and E. M. Floyd. In the Gaya district Mr. Grundy mentions three mica mines, *viz.*, the Sapahi mine owned by Babu Dirgopal Lal, the Singar mine leased by Messrs. Chrestein & Co., and the Chatkari mine leased by Babu R. B. Majumdar.

The Chatkari mine was worked for eight months only, and the estimated production amounted to 18 tons valued at ₹13,050. The mines are worked by manual labour and dynamite is used for assisting the dislodgment of the surrounding rock. Digging is performed by implements of local manufacture. The number of labourers employed in the work was 880, they were paid according to the following rates:—Males 2 to 4 annas, females 1½ to 3 annas, children 1¼ to 2 annas. The mine at Singar is not working satisfactorily, and one at Belain was closed last September.

Of the Nellore district, Madras, the mica mines have risen in number from 4 to 33, all of which are owned by native firms. Returns from Madras Presidency show outturn in 1897 of 246 tons, the value of which is not stated.

153. *PROSPECTS.*—The method of working is not the same in all the mica-producing districts. For instance, in Gaya the quarries are worked by manual labour and blasting. In Monghyr they are formed by means of iron crowbars and the rocks are sometimes blasted by dynamite, and the strata of mica thus removed. Where the surface gives indications of mica, pits are frequently sunk. In Hazaribagh, the mines are worked in the Native fashion by means of pits, and no European machinery or contrivances are resorted to.

154. *TRADE.*—The demands for Indian mica continue to increase as the uses of the mineral are extended for electrical purposes, for gas furnaces, for cooking stoves, lamps, and the like.

The following statement may be given of the foreign traffic in mica:—

Exports of Mica from India and the Countries to which exported.

Provinces from which exported.	1892-93.		1893-94.		1894-95.		1895-96.		1896-97.	
	Cwt.	₹	Cwt.	₹	Cwt.	₹	Cwt.	₹	Cwt.	₹
Bengal . . .	3,310	4,33,772	4,843	7,65,879	5,126	6,04,719	8,835	9,95,102	8,807	9,62,724
Bombay . . .	18	511	5	120	10	879	77	2,829	34	1,892
Burma . . .	1	65	6	700	6	712	1	220	...	...
Madras . . .	...	...	...	...	...	...	...	...	3,985	1,88,748
TOTAL .	3,329	4,34,348	4,854	7,66,699	5,142	6,06,310	8,913	9,98,151	12,826	11,53,364

Exports of Mica from India and the Countries to which exported—contd.

Countries to which exported.	1892-93.		1893-94.		1894-95.		1895-96.		1896-97.	
	Cwt.	₹	Cwt.	₹	Cwt.	₹	Cwt.	₹	Cwt.	₹
United Kingdom	1,388	2,40,952	2,598	5,28,514	3,039	2,78,135	3,466	4,56,942	10,391	9,13,984
France	...	...	26	8,150	20	5,050	3	1,000	3	1,000
Germany	5	764	169	33,518	92	28,038	285	21,794	303	38,006
Egypt	...	...	...	...	...	...	...	...	...	...
Mauritius	...	...	...	...	...	...	...	...	...	...
Austria	100	236	...	...	4	1,747	2	802	...	...
United States	1,834	1,92,380	2,061	1,96,517	1,937	2,91,940	5,076	5,11,088	2,113	1,99,504
Arabia	...	...	...	...	...	...	...	...	...	...
Straits Settlements	...	...	...	...	24	228	4	80	...	...
Natal	2	16	...	...	...	...	...	...	...	...
Other countries	...	...	...	...	26	1,172	77	6,445	16	870
TOTAL	3,329	4,34,348	4,854	7,66,699	5,142	6,06,310	8,913	9,98,151	12,826	11,53,364

155. The following passages are taken from the provincial reports for 1897 by way of amplifying the particulars above.

Bengal.—In the Nawadah sub-division of the Gaya district there were four mines at work, *viz.*, (1) at Singar, (2) at Chatkari, (3) at Sapahi, and (4) at Belam. One of these, however, (No. 3) worked for 8 months only. The estimated production is 18 tons valued at ₹13,050. The estimated production in Monghyr is 29 tons, valued at about ₹6,974. The estimated production in Hazaribagh is 396 tons, valued at ₹1,78,768. A sum of ₹8,249 was credited to the Forest Department on account of mica mines during 1895-96 as against ₹7,697 in 1894-95.

Burma.—Ruby Mines.—Mr. D'Attaides, who was granted a concession, has abandoned working in this province. A small quantity of mica was extracted in 1895, but the returns for 1896 and 1897 were blank.

Madras.—Of very inferior quality available in considerable quantities at Kodur and between it and Chipurupalle in Vizagapatam, but not of marketable value and not worked.

The mineral is also found in certain places of South-East Wynaad in the Nilgiri district but is not worked. Production in the Presidency in 1895, 23 tons, in 1896, 22 tons, and in 1897, 246 tons.

Mysore.—Estimated outturn during 1895, 61 cwt., valued at ₹244. The figures furnished for 1896 were 41 cwt., valued at ₹137, and those for 1897 are 55 cwt., valued at ₹211.

Grants and Licenses since 1889.—Sixty-nine mining and prospecting grants and licenses have been issued, 36 being in 1895, 34 in 1896 and 35 in 1897. It may, in fact, be said that, comparatively speaking, greater activity has been shown with mica than with any other mineral.

XXIV.—PLUMBAGO (*Sisa*, HIND.).

156. ***OCCURRENCE.***—The localities where Plumbago (Graphite) has perhaps been found most abundantly in India are in the Madras Presidency, especially in Travancore, where the mineral is of better quality than elsewhere, although apparently inferior to that worked in Ceylon. In Travancore the mineral is found in Punalur and Vellanad in the Neduvengad taluq. It is worked by sinking shafts in the veins and sloping away intermediate blocks of vein, which are subsequently filled up with rubble from the surface. A poor quality of graphite occurs in the Vizagapatam district. Dr. W. King *Provisional Index of Distribution of Important Minerals)* says of this locality that the mineral is "the best form of graphite known in the Madras Presidency. It exists in fairly large quantity." An announcement commented on the Review for 1895 of recent discoveries of plumbago in the Godavari district excited some interest. It may, therefore, be useful to quote in this place the official information to hand on that discovery. "Adverting to Board's memorandum No. 1759 Mis., dated 9th April 1896, I have the honour to state that good graphite is obtainable in several parts of the Bhadrachalam taluq and in the Rampa Agency. The partners of Messrs. Binny & Co., of Madras, and those of Messrs. Hall, Wilson & Co., of Cocanada, have applied to me for licenses to prospect for this mineral in the villages of Peddakonda in the Bhadrachalam taluq and in Yerramattaloo in the Rampa Agency. Licenses to prospect for the mineral in the former village have been issued to them for a period of six months commencing from 13th February 1896. The Special Assistant Agent has recently sent to me a quantity of black earth resembling graphite, procurable from a hill known as Korukonda Hill, in the Rampa Agency. I have sent it to the Chemical Examiner to the Government of Madras for analysis. No reply has yet been received from him."

PLUMBAGO. Plumbago has been found to occur in a considerable bed at a place called Mulkanoor in Hyderabad. In Bengal it is found at Kakwara in South Bhagalpur, and is said to be met with in the Banka sub-division of the same district. The search made at Kakwara to find larger deposits has not been successful.

It may thus be added in conclusion, on the subject of the Indian sources of this mineral, that masses of several pounds' weight, much mixed with earthy matters, have been met with in places wide apart, but no vein or shoot of any extent has as yet been discovered.

157. ***OUTTURN.***—The quantity produced in 1894 at Travancore was 1,597 tons, the value of which is not stated; returns for 1895 and 1896 have not been furnished. Regular mining is carried on, but the industry is depressed through the inferior quality of the mineral, though it is available in abundance. The outturn for 1897 is 60 tons, produced in the Godavari district of the Madras Presidency.

SOAPSTONE.

XXV.—SOAPSTONE, STEATITE or MASSIVE TALC.

(*Abrak*, HIND.; *Kangusan*, BURM.)

158. ***OCCURRENCE.***—The common coarse variety of this mineral is known as Potstone. The colour of steatite varies from red to grey and white according to the iron oxides in it; but the stone consists essentially of magnesium silicate with small quantities of alumina, iron and lime.

Madras.—The finer forms of the rock for which there is a demand in England, are not very extensively met with in India; the best occurs near Betumcherla in the Kurnool district of the Madras Presidency. Following that, the soapstones of Anantapur, North Arcot, Bellary, Cuddapah, Salem, Malabar, Nellore, South Kanara districts, and Pudukkotai State may be mentioned. There is no established industry, in the soapstone of Anantapur and Kurnool, the mineral-bearing localities being, in fact, included in the forest reserves. The stone has been worked for several years, however, under forest permits in Sydapuram village of the Nellore district, where the yield is said to be inexhaustible. The excavation of the stone constitutes the only source of living to a large number of families in the villages where it occurs. Some speculators applied for mining rights under the lease system, but in consideration of the stone affording a living to the villagers the permit system has been kept in force.

In two villages of Cuddapah quarrying of soapstone is carried on on a somewhat large scale. The stone is found on the sides of hills at a small depth from the surface and is dug out by means of crowbars.

The working season is between January and July, and two to sixteen cart-loads of 33 maunds each are quarried in the course of a month. The stone in Malabar is said to be very gritty.

This stone is reported to occur in the Warungal and Indore districts of His Highness the Nizam's Dominions. During 1897 the production was valued at ₹152. Quantity cannot be furnished as the working of the mines is given out on contract.

The quantity of soapstone produced during 1891-92 was 321 tons. Separate returns for 1894 were not available, but it is stated that the total production of the Presidency including the Native States was, in 1895, 103 tons. The yield during 1896 was returned at 212 tons. The quantity produced in 1897 is estimated at 117 tons, the value of which is not stated.

Bombay.—It is found in the Dharwar, Belgaum, Kolhapur, Ratnagiri and Kanara districts of the Bombay Presidency. The stone is also reported to occur sparingly in the Junagadh State of Kathiawar.

Bengal and North-West Provinces.—In Bengal soapstone is met with in the Manbhum district. It is also found in the Lalitpur sub-division of the Jhansi district and at Hamirpur in the North West Provinces. The total production in 1894 was estimated at 92 tons, in 1895 at 59 tons, in 1896 at 45 tons and in 1897 at 34 tons. The stone is obtained from open working and is made into cups, images and the like. The industry, however, is of very trifling character, and is on the decline.

Central Provinces; Rajputana and Central India.—The marble rocks in the Jabalpur district and Kanheri in the Bhandara district of the Central Provinces give capital stone. The production of the quarry in Kanheri during 1897 was 71 tons of which 11 tons were utilized in the manufacture of 24,000 cups valued at ₹750. The total cost of management of the quarry and the factories was ₹675, leaving the dealers with a net gain of ₹75. The factories are locally called *jantars*; there were ten at work during the year. In fact, the next best localities are in the Jaipur State of Rajputana. A soapstone quarry has been found near Rayala in Jaipur; the stone is of the best quality and exported in large quantities to the Panjab. The average number of men employed daily on these quarries is nearly 520. The aggregate value of these stones at the quarries amounts to ₹62,354 which gives an average of 5 annas a day to the workmen. The mineral also occurs in the Bundelkhand States of the Central India Agency as, for example, at Orchha and Bijawar. The revenue from the stone in the former was last year ₹1,955, and in the latter the production was 1·28 tons, valued at ₹133.

Mysore.—The returns furnished by this State show a production in 1897 of 464 tons, valued at ₹1,590.

Burma.—There are mines of soapstone in the Prome, Pakokku, Katha, Bhamo, Kyaukpyu and Minbu districts of Burma. On the hills round Prome it lies about a foot and a half below the surface. The Minbu quarries and those in Kyaukpyu district, where four out of the twenty-six mines are being worked, are all in a group on the borders of Arakan and Uppper Burma. The steatite occurs in veins of 6 inches to a foot thick. In the Bhamo district soapstone is met with to the north and north-east of the Jade and Amber mines, and in another distant locality far up the Irrawaddy. Several of the Minbu quarries are annually leased to Burmans, the leases being disposed of by auction. In some cases, besides a lump sum down, a royalty on the outturn varying from 10 to 20 per cent. is reserved to Government.

159. ***OUTTURN.***—The Burmese (Minbu) production in 1894 was said to have been 16 tons, valued at ₹12,500. In 1895 it was 19 tons, valued at ₹3,750. No explanation was offered as to the reason of the difference in the valuation as compared with the returns of 1894. In 1896 the yield was 12 tons, value ₹6,000. The output during 1897 is reported at 17 tons, valued at ₹8,250. In Pakokku 488 tons were quarried during 1897, valued at ₹3,080. The industry is not carried on to any very great extent. The increase in value is probably due to greater demand. During 1894 the outturn in Hyderabad was put at ₹117 worth, in 1895 at ₹114, in 1896 at ₹73, and in 1897 at ₹152. Particulars as to quantity are not available since the sums mentioned were the license fees for permission to work the mines. The soapstone produced in the Mysore State in 1894 was estimated at 597 tons, value ₹2,252, in 1895 at 215 tons, valued at ₹950, in 1896 at 565 tons, value ₹1,554 and in 1897 at 464 tons, valued at ₹1,590. The production in the Madras Presidency in 1894 was put at 58 tons, in 1895 at 103 tons, in 1896 at 212 tons. and in 1897 at 117 tons. The value of the outturn in Bundelkhand, Central India, for 1894 was estimated at ₹2,025 and for 1896 at ₹2,650. The value of the production during 1897 is stated at ₹2,088. In Ratnagiri (Bombay) the output is estimated at ₹500. Figures showing total quantities produced are not given. The total number of persons employed at Steatite mines (permanently and temporarily) has been returned at 200. SOAPSTONE.

160. ***USES.***—The modern European demand for steatite to be used in the manufacture of gas burners and other purposes is considerable. But for burners steatite that can stand a high temperature is essential and it must be fine in texture and free from grit. In testing for quality the mineral should be broken across the grain to see that it is not flaky or scaly. From recent reports on this subject it seems likely that the future may see a greatly extended foreign demand in competition with the steatite obtained from Germany.

In Salem potstone is excavated and chiselled into culinary utensils of various sizes by professional workers, and these vessels are exported to different districts. There is a regular industry in these commodities. The trade in Bellary stone vessels has not been flourishing as there is not much demand for the articles. The stones from Cuddapah are used for polishing the walls of buildings, and are chiefly sent to Madras, where there is a great demand for this kind of work. Specially prepared pieces are also employed as pencils for writing on slates.

XXVI.—TIN ORES (*Rang, Kallai*, HIND. ; *Kémabyu*, BURM.). TIN ORES.

161. ***OCCURRENCE.***—These are only known as yet to occur in any very promising quantity in Maliwun sub-division of the Mergui district of Lower Burma, where the mines are in a portion of the great stanniferous belt that stretches along the granite backbone of the Malay Peninsula with scarcely an interruption. In Tavoy tin mines exist in the Central and Northern townships and were leased during 1897 for a term of 21 years at a royalty of ₹3 per *picul* of 133⅓ on the value of all tin and tin ore extracted from the mines. In Mergui they extend continuously in fact from the Siamese frontier along the whole seaboard to at least the latitude of Tavoy, beyond which the great gigantic axials disappear below the greater overlying deposits of more recent stratified rocks that sweep southward. The interior is but little known, and it seems that the heaviest out-crops of the granite, with which the tin is associated, are the more plentiful towards the coast.

Judging, however, from the fact that heavy tin is worked on a commercial scale at Thibawleik in the Tenasserim valley, and that tin is found in the Siamese States of Bantaphan, of Chomphom, and Faungswan, along the Gulf of Siam, it is hoped that the main watershed may be found to throw off spurs of stanniferous granite at least as valuable as the out-crops in the secondary axials along the coast. In the Maliwun sub-division there are four main centres at which tin is worked, though these form practically the four earliest points of attack along a more or less continuous stanniferous belt, running for 200 miles north and south, with a mean width of perhaps 20 miles.

The main points give their names to the four principal fields :—

(1) Maliwun.
(2) Karathuni, Banhuni.
(3) Bokpyin.
(4) Migyaungchaung, Yayugon.

In these and all other fields the tin occurs in more or less imperfect fissure lodes, frequently shattered and distorted by more recent movements, which (as at Maliwun and Renaung) are not unseldom accompanied by silicious hot springs, probably rising on the lines of *fault* through which the tin has penetrated. Occasionally also they permeate the metamorphic rock through which the granite has been upheaved.

The lodes except Khowmaung near Maliwun, where a few Chinese have been for some time picking at the out-crop with crowbars, are not worked commercially ; specimens of heavy tin ores received from Hangpon, Bokpyin, Sadein, and Thibawleik prove these lodes to be widely distributed. The alluvial tin has been derived from these lodes by the gradual denudation of the hills containing them, and is now deposited in the form of a more or less coarse sand mingling with the gravels and other alluvial deposits in the river valleys and gentle slopes at the foot of the granitic hills.

In this operations are carried on by simple process of alluvial working ranging from the rude methods of the "Tampan" (= hill, a Chinese word) worker, who contents himself with "fossicking" in the narrow hill valleys, to the larger open mines on the plains, where immense gravel pits are opened, and the "Karang" (or pay dirt) is raised from depths of sometimes as much as 30 feet. This *karang* contains the tin oxide which is separated from it by working. The ore is then smelted with charcoal in a small open blast furnace of the pattern known as the *ponkah* furnace.

TIN ORES.

162. *OUTTURN.*—The total output in 1894 was 98 tons, valued at ₹1,08,700, of which 81¼ tons were exported, valued at ₹89,650. The balance, 16¼ tons, were kept for export in 1895, the market having fallen towards the end of the year. The *Financial and Commercial Statistics of British India for 1896* show the production as having been only 75 tons, valued at ₹37,883. The returns furnished to this office by the Burma Government as the Mergui production of 1895, come to 21$\frac{8}{10}$ tons, valued at ₹23,464. The outturn during 1896 was 81 tons, valued at ₹81,443. The total production for Burma in 1897 is reported to have been 61 tons, valued at ₹39,555. Of this the Mergui production is 60½ tons, valued at ₹39,190, and in Tavoy ½ ton, valued at ₹365, was produced during the year.

The industry, which has been for many years in a depressed condition, was in 1894-95 thought to be reviving. The returns for 1895-96 and 1896-97 were not, however, very encouraging, notwithstanding that six mines were started at Mergui in 1896. It is difficult to say how many persons are actually employed in this industry, since the bulk of the extra hands in the rains are as much fishermen or agriculturists as miners. The figures published for 1893-94 show 407 persons permanently employed and 205 temporarily. In 1895 they were 83 and 97, respectively. A great stimulus was thought to have been given to the tin industry by the grant of a lease to Captain Menzell of Singapore. The lease was granted in 1892 and conveyed to the Captain exclusive rights for five years of mining for tin in the Maliwun township, except in areas occupied by Native miners. On the expiry of that period, a lease for 21 years was granted to Captain Menzell on the condition that he had worked his five years' concession in a satisfactory manner. Captain Menzell began operations by importing a number of Chinese miners from the Straits Settlements, and he is said to have been hopeful to increase the number of his miners and develop the concession rapidly. Returns for 1896 state that the lease has since been transferred to the Jelebu Mining Company.

163. *TRADE.*—The trade in tin consists for the most part of imports from foreign countries. During the past five years these have averaged 44,218 cwt., valued at ₹30,76,094. The imports in 1894-95, 1895-96 and 1896-97, and the countries from which these supplies were drawn are shown by the following table:—

Imports of Tin, 1894-95, 1895-96 and 1896-97.

Countries whence imported.	1894-95.		1895-96.		1896-97.		Share taken by each Province.	1894-95.		1895-96.		1896-97.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Province.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Cwt.	₹	Cwt.	₹	Cwt.	₹		Cwt.	₹	Cwt.	₹	Cwt.	₹
United Kingdom .	2,947	89,459	832	55,243	901	54,236	Bengal . .	27,724	18,06,505	27,335	18,53,924	21,059	12,93,100
Ceylon . . .	20	1,474	...	24	13	606	Bombay . .	14,455	97,89,932	15,573	9,57,825	9,788	5,56,933
China—Hongkong	8	639	18	1,499	2	200	Sind . .	...	...	17	358	...	...
Straits Settlements	45,444	31,14,782	49,431	32,32,500	35,436	21,45,893	Madras . .	5,206	3,56,602	6,643	4,31,692	5,233	3,36,371
Other Countries .	6	658	48	4,839	45	4,429	Burma . .	1,040	46,964	761	50,306	317	18,950
TOTAL .	48,425	12,07,003	50,329	32,94,105	36,397	22,05,364	TOTAL .	48,425	32,07,003	50,329	32,94,105	36,397	22,05,364

The exports of tin were last year 1,688 cwt. block tin from Burma to the Straits.

SALTPETRE.

XXVII.—SALTPETRE or NITRE—(*Shorá*, HIND.).

164. *OCCURRENCE.*—The Saltpetre of Indian commerce is derived mainly from Behar (chiefly Tirhut, Saran, Monghyr, Gaya, and Champaran), and to a very much less extent from North-West Provinces (Cawnpur, Ghazipur, Allahabad, and Benares), with a small amount from the Kashmir (outturn in 1897, 19 cwt., value ₹143), Panjab, Central India (production in 1897 at Bhind and Jwargarh reported to have been 151 cwt., value ₹437), Bombay, Madras (Coimbatore, Kistna, Madura, Nellore, Salem, South Canara, Trichinopoly, etc.), and from Burma. In Saran there are 166 works for the refinement of saltpetre, and an average number of 3,320 persons are daily employed in the dry weather. The Superintendent, Salt Revenue, Saran, reports that "42,950 maunds of refined saltpetre were produced in this district during the year 1897-98, and the average selling price was about ₹5 per maund. There were besides 9,949 crude saltpetre works during the year, and it may be approximately estimated that at the rate of 50 maunds each they produced 497,450 maunds of crude saltpetre."

Under the name of *Shorá*, it occurs as a natural efflorescence on the surface of the ground. It is in that condition mixed with several other salts, chiefly the chlorides of potassium and sodium, nitrate of lime and sulphate of soda. The last-mentioned salt is, as a rule, the most abundant. But the saltpetre lies as it were in patches, some parts of the efflorescence being more productive than others, according as carbonate of lime and sand predominate.

165. ***REFINING.***—The following description of the manufacture of saltpetre from saline earth in the North-West Provinces has been furnished by the Director, Land Records and Agriculture. The saline earth known as *lona mitti* is first dug out, dried in the sun, pounded with a mallet and trampled down by the feet. It is then filled in the *ahiri* or *kunri*, an oblong tank surrounded by four walls about 2 feet high, having inside it a filter made of wicker work or sticks over which the earth is usually placed. Water is then poured over the earth and allowed to filter through carrying the nitrate and chloride of sodium in solution. The filtrate flows down a channel into a *nand*, an earthen vessel sunk in the ground. Water is poured on until the filtrate obtained is colourless. The contents of the *nand* are then transferred to an iron pan, placed on a furnace and boiled. In the course of boiling the chloride of sodium (common salt) is precipitated with other impurities forming a sediment at the bottom of the pan, the nitrate remaining in solution. The boiled solution is then decanted off and put in another pan to cool. When cooled, the solution is transferred to a number of *nands* or other receptacles in which it stands for six or seven days until the crude saltpetre (*kachcha shorá*) has all crystallised. The crystallised mass which is of a dirty pale colour and contains many impurities is collected, dissolved in water, boiled and passed through a strainer and the clear liquid poured into wooden tanks called *mez*, in which mats (*tattis*) made of thin and flexible pieces of wood are suspended. In course of six or seven days the saltpetre separates from the liquid and the crystals attach themselves to the *tattis*. The product thus obtained is called *qalmi shorá*, but it still contains a large percentage of impurities which are removed by washing the mass with water, and the saltpetre of commerce is then obtained. The liquid left behind in the *nands* and *mez* is utilised again for dissolving fresh crude saltpetre in; as it still contains a certain percentage of the nitrate which is eliminated afterwards by using the liquid in this manner. When this liquid has become so weak as to be incapable of yielding any appreciable quantity of the nitrate, it is thrown on earth intended to be used for manufacture of saltpetre.

Refining.

NORTH-WESTERN PROVINCES.

In Bengal the *Loneahs* (or rather *Nuniahs*) or Native manufacturers of saltpetre commence operations in November by scraping off the surface soil from waste ground, mud, buildings, etc. This is then purified by solution and filtration, the principle involved in the purification being the varying rates of solubility of the salts at different temperatures. The next stage is to evaporate the saltpetre liquor to a crystallising state. This is generally accomplished from April to June. For this purpose the liquor is put into earthen pots (*nads*) fixed in two rows over an oblong trench dug in the ground. The interspaces between the pots are filled in with clay and an aperture left at the further end to allow of the escape of smoke, so that the contrivance becomes converted into a crude furnace. The fuel employed is generally the dry fallen leaves of the mango tree.

BENGAL.

After evaporation has been carried to the crystallisation stage, the liquor is removed and the salt allowed to deposit on cooling. Glue is not employed in India to assist in the separation of the extractive matters. The saltpetre manufactured in this way is for the most part a crude article which has again to be refined at the Calcutta refineries. "To make refined saltpetre, crude saltpetre is merely dissolved either in a menstruum of water or saturated brine, and the foreign salts being removed by precipitation in the process of boiling, the saltpetre brine, thus freed from impure or foreign salt, is strained and purified and set to clear, and is cooled until the crystals of pure saltpetre are completely formed. These are collected, washed in water or alum water, drained and dried. They are then fit for the market and are often found to possess a high degree of purity. The foreign substance removed by precipitation is chiefly common salt."

In Madras, *Upiliyas* collect nitrous earth and pass it through a preliminary process of solution and evaporation. The resulting crystals, containing a large proportion of common salt, are sold to licensed refiners. The refiners separate the salts by evaporating a saturated solution over a fire when the common salt first becomes insoluble. The process depends upon the fact that salt is equally soluble in hot and cold water, while saltpetre increases its solubility with an elevation of temperature. When most of the sodium chloride has been precipitated the final liquor is set aside to allow the nitrate to crystallise. Even this refined saltpetre is impure and seldom attains the character of the imported potassium nitrate.

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The area over which saltpetre is manufactured has been estimated at 232,314 square miles. In 1892-93 there were 543 licensed refineries and 44,925 licensed works for the manufacture of crude saltpetre. In that year the manufacture came to 48,800 tons of crude saltpetre, of which 47,580 tons were purchased by the refineries and purified—yielding rather over 27,580 tons of refined saltpetre (*Systems and Practice of Salt Administration in India*)."

The *Financial and Commercial Statistics* for British India, Fifth issue, 1898, show for the year 1896, 343 refineries in Bengal that give employment to a staff of 5,940.* In Madras the corresponding figures would appear to be 1,401 refineries (1,291 of which are in Coimbatore) employing a staff of 191†. In the Panjab there is only one refinery (the Saltpetre Factory at Hodal) that gives employment to 160 persons. The Census of 1891 puts the saltpetre workers and sellers for all India at 119,558, of whom 2,631 were recorded as residing in Native States.

166. ***TRADE IN SALTPETRE.***—In the Review of Mineral Production for 1895 a passage was quoted to show that the uses of saltpetre had within recent years been narrowed.* It is believed that the low prices that prevailed during 1895-96 encouraged, however, a revival of the exports, and in consequence the returns of last year stood at 528,452 cwt., valued at ₹57,21,638, or an expansion on the exports of

* In the case of 54 refineries at Durbhanga, information under this head was not furnished.

† Of 1,291 factories in Coimbatore, information under this head was received from only 14.

SALTPETRE. 1895-96 that came to 25·29 per cent. on the quantity and 6·75 per cent. on the value. The highest record took place in 1849-50 when 508,316 cwt. were exported, the lowest in 1893-94 when only 321,933 cwt. were exported. The following were the exports during the past 15 years:—

Trade.

	Cwt.	Rx.		Cwt.	Rx.
1882-83	399,565	388,766	1890-91	399,690	380,059
1883-84	491,668	464,410	1891-92	389,185	365,618
1884-85	451,917	425,000	1892-93	443,931	438,940
1885-86	402,174	370,200	1893-94	321,933	338,102
1886-87	397,572	376,091	1894-95	352,985	411,365
1887-88	386,396	364,016	1895 96	421,769	535,945
1888-89	420,503	401,801	1896-97	528,452	572,163
1889-90	422,229	411,276			

The following tables classify the exports of saltpetre from India during the past five years under the provinces from which exported and the chief countries to which exported :—

Exports of Saltpetre from India and the Countries to which exported.

Provinces from which exported.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Bengal	438,408	320,438	350,604	418,362	519,422
Madras	46	6	62	11	1
Bombay	1,194	796	958	1,139	4,357
Sind	4,283	693	1,361	2,257	4,672
Burma	...	...	...	...	...
TOTAL	443,931	321,933	352,985	421,769	528,452

Exports of Saltpetre from India and the Countries to which exported.

Countries to which exported.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
United Kingdom	153,108	123,322	114,003	117,028	246,338
United States	142,830	65,340	86,711	126,251	137,663
Hongkong	83,864	63,115	88,015	116,920	70,287
France	6,876	8,751	5,723	4,395	13,894
Mauritius	31,345	33,437	32,358	28,379	20,333
Straits Settlements	12,881	14,811	11,649	16,508	7,051
Australia	530	601	687	1,418	841
All other Countries	12,497	12,556	13,839	10,870	32,045
TOTAL	443,931	321,933	352,985	421,769	528,452

XXVIII.—FULLER'S-EARTH (*Sabún-mitti, Multani-mitti,* HIND.).

FULLER'S-EARTH.

167. *OCCURRENCE.*—As regards the distribution of Fuller's-Earth in India, information is very incomplete. It is known, however, to be carried for long distances from certain localities where it occurs, as, for example, in the Bhagalpur Division of Bengal. In the neighbourhood of Colgong, a soap-earth is obtained. In Rajputana a fuller's-earth used to be procured from fissures in quartz and schistose rocks. In some parts of Western Sind a pale-greenish clay is found which is used for washing cloth, etc. In Hyderabad (Sind) there is in fact said to be a fuller's-earth mine situate in the Hala sub-division. In the Panjab in Dera Ghazi Khan and Multan districts, a clay resembling fuller's-earth is imported from the interior of the Suleman Range and conveyed all over India under the name of *Multani-mitti*. At Nilawan, in the Salt Range, a lavender-coloured clay or decomposed rock is employed by the Natives as a fuller's-earth. Rajputana, especially in the States of Bikanir and Jeysalmir, has rich deposits of fuller's-earth. In Jeysalmir there are four quarries at Mandhan, Nadai, Ramgarh and Mandai. The clay is found in thin layers. It is carefully extracted and used for washing the hair without any preparation. The production in 1897 was 313 tons, valued at ₹500. The *geru* clay also found in that State (to the south-east) occurs in small lumps. These are used by the *Sadhus* to dye their cloths and by the Government to dye tent cloth. *Seri-mitti* is also met with. This exists as lumps that are regularly collected and used in white-washing houses. The production of fuller's-earth from the Bikanir mines was in 1895, 39,723 tons, valued at ₹15,332. No

FULLER'S-EARTH.

return was furnished for 1897. The quarry at Meth in Bikanir is 36,000 feet long, 18,000 feet wide, and 8 feet deep. It has been in existence a long time and will last for an indefinite period. The quarry is worked by pick-axes. The quantity excavated annually is not fixed, but varies according to demand. About 2,000 camel loads are usually carried annually to Sirsa.

168. ***Soapsand*** is found in Burma, in the Myingyan district. The production in 1894 was 190 tons. The production in 1895 was 197 tons, valued at ₹498. The rise in value is due to a better quality of soap-sand having been obtained during the year. In 1896, 169 tons, valued at ₹240, were produced. The fall in price is stated to have been due to less demand. The production during 1897 was 149 tons, valued at ₹209.

Most of these clays are employed for cleaning the hair, dyeing cloths and weighting paper, but in Manipur a clay of a similar nature is spoken of as edible.

XXIX.—MINERAL PAINT and OCHRE (*Gerú*, HIND.).

MINERAL PAINT.

169. ***OCCURRENCE.***—Mineral paint of a slatish colour is found in a vein technically termed "fault" commencing from the northern extremity of the Kishengarh hill in Rajputana and extending, at least so far as has been hitherto ascertained, for several miles in the north-easterly direction. It has been found to be a good substance for painting wagons, iron work, iron bridges, and the sides of ships. As it has been found by an analysis in the Geological Survey Department of the Government of India to contain very little iron, and the iron being in the state of peroxide, there is no further room, it is stated, left for oxidation or rusting. Samples have been sent to various places both in England and India, but no market has as yet been created for it. It has, however, been approved by the Rajputana-Malwa Railway, and a small paint-manufacturing machine has been erected at their workshops for making paint of the mineral. The paint has also been found to have lasted fairly well. The Jodhpore-Bikanir Railway authorities have decided on giving it a further trial before finally making use of this paint. The mineral contains about 10 per cent. plumbago which in itself is a valuable substance for making lead pencils. No attempt has, however, hitherto been made to utilize the plumbago.

170. ***OCHRE.***—Found in parts of the Meywar State, Rajputana. In 1894, three and a half tons were obtained, valued at ₹5, in 1895, 17 cwt., valued at ₹1-4, and in 1896, 71 lbs., valued at ₹50. Return for 1897 has not been furnished. In Hyderabad Deccan, red ochre is met with. The quantity produced in 1894 was valued at ₹28, that for 1895 at ₹30, and for 1897 at ₹25. It is explained that the quantity cannot be stated as the mines are given out on contract. Red ochre is also found at Boraundha in Bundelkhand, Central India Agency, where the outturn in 1894 was estimated at 13 tons, value ₹62, and in 1895, at 5,673 tons, valued at ₹681-12. The returns furnished for 1896 and 1897 are blank. Figures showing quantity for all India are not available. In the Bellary district of the Madras Presidency red, brown, yellow and purple ochres, large in quantity and of excellent quality occur in the ferruginous schist bands of these regions. Ochres are also met with in Trichinopoly and the Nilgiris.—*Prov. Index (Madras), p. 17.*

XXX.—SODA SALTS (*Khari-nun ; and Sajji*, HIND.) (Other than Common Salt.)

SODA SALTS.

OCCURRENCE.—In very many districts of India Sulphate and Carbonate of Soda are manufactured from the surface soil or saline efflorescence. Dr. Center classified the *reh* efflorescences of Indian soils into three groups: 1st, the neutral which contain no carbonate. These consist chiefly of sodium chloride and sulphate and frequently magnesium sulphate; 2nd, the alkaline, which contain sodium carbonate and alkaline chlorides and sulphates, but no lime or magnesian salt; 3rd, the nitrous efflorescences; these consist chiefly of calcium nitrate and alkaline chlorides, but no carbonates. From a large number of analyses of *reh* published in the *Agricultural Ledger* No. 13 of 1897, Dr. Leather found sodium carbonate, sulphate and chloride present in most of the samples. Of the Madras Presidency it has been remarked under the heading Salem that soda salts occur in every district and especially in dry beds of streams that drain cotton soil areas.—*Prov. Index (Madras), p. 19.*

Soda-salt is also produced in the Bombay Presidency in the Thar and Parkar districts, the return for 1897 being 196 tons, valued at ₹3,683.

171. The ***Sulphate*** known as *Khari* or *Khari-nun* or *Chamra-khari* is prepared either by solar evaporation (*abi*) or by the use of artificial heat (*jaria*). The salt known as *patna-khari* is a pure form of sulphate produced by first burning the efflorescence with alternate layers of rice straw, then lixiviating the calcined mass.

Sulphate of Soda, prepared by one or other of these methods, is an article of local trade in Behar, Fattehpur, Etah, Bulandshahr, Hurdui, Patiala, etc. It is chiefly used in hide curing.

172. The ***Carbonate***—(*Sajji*) exists either as natural mineral obtained from saline efflorescence or as Barilla derived from the ashes of certain plants. To obtain the former, shallow basins are formed, about ten yards square. Into these beds water is admitted to a depth of two or three inches. The soda efflorescence of the neighbourhood is then thrown into the water until a thick pasty mass is produced. This is smoothed over and in a week's time a concentrated efflorescence forms on the surface. This is collected by the hand and is known as *papri-sajji*. To make *sajji* the *papri* is again dissolved and boiled in earthen vessels until the impure carbonate forms into a hard mass.

SODA SALTS. Impure carbonate of soda or *sajji-mati* is converted into caustic soda by the employment of lime; double decomposition is effected, the soda being left in solution and carbonate of lime being precipitated. The Manager of the Paper Mills, Raniganj, uses sixty tons of *sajji-mati* monthly for the manufacture of caustic alkali.

In 1891-92 there were 2,266 works licensed to manufacture *khari*; 1,183 to make *sajji*; and 55 to make *rassi*. During that year 9,150 tons of *khari* and about 6,405 tons of *rassi* and *sajji* were manufactured. The following passage on the manufacture of these crude soda salts may be given :—

"***Khari*** (or sulphate of soda) and *rassi* and *sajji* (or impure carbonates of soda) are prepared by a process very similar to that by which crude saltpetre is produced. The quality of the earth collected is of course different in each case, but the nature of the filters, boilers and pans employed is the same; and for evaporation and condensation of the brine, boilers and *chunam* pans are both used, the former in Behar and the latter in the North-West Provinces and Oudh, where prolonged dry hot weather may be more confidently reckoned on than in Behar. *Patna-khari*, as the *khari* produced in Behar is called, is used chiefly for preserving hides, and also as a cathartic for cattle, and sells at from 8 to 12 annas a maund. It contains very little sodic chloride. *Khari* produced up-country by solar evaporation is much used as a cathartic for cattle. It contains a considerable percentage of common salt (20 to 30, and sometimes even more per cent.), and realises from 12 annas to a rupee per maund. *Rassi* and *sajji* are used by dyers and soap-makers and also by tobacconists as an ingredient in the preparation of *hukka* tobacco. The price ranges from 12 annas to R1-4-0 per maund."

173. ***Barilla*** is chiefly manufactured in the Panjab from various plants known generally as *láni*. These are burned in pits in successive relays until a sufficient amount of ash has been accumulated. The ash is then covered with a thin layer of earth to prevent loss by evaporation and is left to cool. After about a week the layer of ash in the bottom of each pit is found to be a hard mass of *sajji*.

Barilla is manufactured in the districts of Mooltan, Jhang, Montgomery, Shahpur and Dera Ismail Khan.

Barilla is prepared in Montgomery, from various plants known as *láni*, *lana* and *Kangankhur*. In Dera Ismail Khan it is prepared from *lana*, and the ash in the bottom of the pit takes three or four days to form *sajji*. In Jhang it is prepared in two ways, (*a*) from a plant called *sajji*, (*b*) from *láni*. The process in both cases is the same as described above, but the products differ in quantity and colour. The *sajji* obtained from *láni* is inferior and black in colour, while that prepared from *sajji* plant is superior and whitish-grey.

174. ***Black Salts.***—(*Kala-nun*) is an article of some importance in local markets in India. It is prepared in Upper India, chiefly at Bhewani in Hissar. Common salt is heated with the chebulic and emblic myrobalans together with *sajji*, until a sort of fusion takes place. The article so manufactured is used as a medicine.

175. ***Phuli.***—"A salt of soda imported into Leh from Changthan, Rupshu, and Nubra in Ladakh. It is very extensively used in Ladakh for mixing with tea to bring out its strength, and for the same purpose is largely exported to Kashmir and a little to Kulu. It is also employed by the Bhotis for washing clothes and for dyeing wool a black colour." During 1895, nearly 45 tons (1,228 maunds, value R9,210) are stated to have been imported into Kashmir from Ladakh. The corresponding figures for 1896 are 95 tons, valued at R16,279, and those for 1897 are 62 tons, valued at R10,630, or R6-4-0 per maund.

Although a few of the provincial returns make mention of the soda salts, other than common salt, definite statistics have not been furnished. The above remarks have been thrown together partly to indicate the regions where these salts are obtainable, and partly in order to establish a position where in future Reviews mention may be made of the extent of the traffic in these minerals.

176. ***USES.***—*Reh* and *sajji* are put to an infinite variety of uses by the natives. The salts are employed for dissolving crude lac and *kamela* preparatory to dyeing silk, also for extracting the crimson dye from safflower for dyeing cotton. They are used for bleaching silk, cotton and wool. *Sajji* is employed in making country paper from hemp in Farukhabad. Both salts in conjunction with shell-lime enter into the composition of country soap. White *reh* is sprinkled into boiling cane juice to neutralise organic acids in the manufacture of raw sugar. *Reh* is an adulterant of tobacco, and is added to increase the weight, sometimes to the extent of 40 per cent. In medicine these alkaline salts are supposed to be digestive and hepatic.

QUARRY STONES AND BUILDING MATERIALS.

CLAY. ### XXXI.—CLAY (BRICKS, TILES, POTTERY) (*Chikni-mitti*, HIND.; *Myeze*, BURM.).

177. ***OCCURRENCE.***—Brick, fire, and pottery clays are pretty generally distributed. The most valuable pottery clays occur in Jabalpur. Clay of a very fine character is also found in Raniganj, Bengal. Large pottery works on the European system have for some years been in operation, both at Jabalpur and Raniganj.

Assam.—The only important pottery works in Assam are those belonging to the Assam Railway and Trading Company at Ledo in the Lakhimpur district. The outturn of these works in 1897 was returned as 694,500 pieces of sorts, valued at R14,584, as compared with 666,287 pieces, valued at R10,660 in 1896. The average number of persons employed in the works was 176 in 1897 against 227 in 1896.

Bengal.—The following particulars have been furnished by the Government :—The estimated production of clays in Burdwan, used by Messrs. Burn & Co. in their Pottery Works, is 14,670 tons, valued at R18,114. Production of brick clay at Muzaffarpur is about 29,581 tons, valued at about R2,773. The estimated production of clay at Balasore is 700 tons. In Puri the estimated production in 1897 is 18 tons, of which 2 tons are yellow clay, 15 tons white and 1 ton red clay.

It may, however, be remarked that it seems likely that the brick-making in the neighbourhood of Calcutta, on the banks of the Hooghly, is the most important industry of this nature in India. It is to be regretted, therefore, that no statistics have been furnished.

The pottery works at Raniganj are well known. The articles manufactured are stove-ware, glazed drain pipes, bricks, tiles and ornamental fancy goods. Bricks, tiles and frontiles are also largely manufactured in Hooghly and Howrah. Earthen pots prepared in the districts of Howrah and Midnapore are exported in large quantities to Calcutta and to the town of Howrah. The clay figures of Ghurni, a part of the town of Krishnagar, are widely appreciated both here and abroad.

A few particulars regarding pottery and brick-making have been supplied by the Director, Land Records and Agriculture :—It appears to be a difficult task to ascertain the number of works opened and the number of men engaged in each brick-yard, for instance, in the Patna district. The earnings per head are given here approximately, *viz.*, Ro-15-0 for moulding 1,000 bricks, two coolies at Ro-2-6 will mould 1,000 bricks in three days. In Gaya brick and pottery clays are abundantly available throughout the district. No estimate can be framed of the extent of their occurrence or production. The industry is carried on by *Kumhars* (potters) and almost in every village. The Kumhars do not work as labourers under any larger traders, but they make pots and sell direct to consumers. Brick-making is, however, at present conducted by other castes as well. Their daily wages very from 2 to 4 annas. The present state of the industry is more brisk than usual owing to construction of bridges for the S. B. and M. G. Railways. The estimated production in Muzaffarpur of brick clay is about 29,581 tons, valued at R2,773.

The District Engineer, Saran, gives the following particulars regarding the production and value of bricks and pottery clays in the district.

CHUPRA SUB-DIVISION.—Pottery works are not carried out on an extensive scale in any place in this sub-division except Chupra. Most of the household pots are brought here by the potters from villages in the interior. Manufacture of bricks is carried on only at Chupra—

	R
(1) Brick-burning about	25,000
(2) Mirren tiles about	5,000

Sewan is the only place in this sub-division where the manufacture of pottery brick and lime is carried on for public sale. The manufacture of brick and lime is fast increasing, while that of pottery is decreasing for want of encouragement. Following is the estimated production and value thereof :—

	R
Bricks 1,000,000	8,000
Pottery	300

GOPALGANJ.—In this sub-division the number of bricks manufactured was estimated at 2,744,484, value R16,380. These bricks were used solely for the Huthwa Raj works, 1st class bricks cost R6-8 to R6-12 per one thousand used locally for creating cutcha and pucca brick walls of ordinary houses of private parties.

Regarding pottery works, there are none of any important nature that can be taken into account. But there are many places where good pottery clays can be obtained.

North-West Provinces.—The following places in the North-West Provinces and Oudh are particularly noted for their fine clay suited for pottery :—Aligarh, Khurja in Bulandshahr, Muttra, Amroha in Moradabad, Chunar, Azamgarh, Lucknow, and Rampur State. Clays of various kinds are also to be found in the Bundelkhand and Baghelkhand States of the Central India Agency.

Panjab.—The pottery factory, which was started in 1894 at Harnpur in the Jhelum district of the Panjab, is no longer in existence. The pottery of Multan and Delhi are famous. The last mentioned are not, however, constructed of clay but from a powder artificially prepared from certain rocks. Hazara clays, specially the red kind, are recognized as the most useful by some of the potters.

Madras.—There are thirty-one works in the Madras Presidency, almost all belonging to Europeans, for manufacturing bricks, tiles and cements ; most of them are situated in Malabar and South Canara districts. Near Rajahmundry in the Godavari distirict *kaolin* is reported to exist, of which goglets, some of superior type, are made, but not on a large scale. A small consignment of this clay has, it is said, been exported to England for experimental purposes. A sort of pale clay is reported to be available in Vizianagram, and to be used for making pots at the local School of Arts. The clay has been identified to be *kaolin* by Mr. Middlemiss, Superintendent, Geological Survey of India. *Kaolin* is said to be found also in the Nilgiris. In Kistna and Chingleput fine white clays occur. Fine plastic clay, used for making figures, is

CLAY.

reported to be found in Cuddalore taluq of South Arcot district. The production of this presidency was in 1895 stated to be 331,624 tons, in 1896, 381,085 tons, and in 1807, 308,785 tons. Pottery clay also occurs in Mercara in Coorg, where tiles and bricks are manufactured by the Mercara Pottery Works. The production of 1896 has been given as 1,925 tons, and in 1897 it is reported to be 1,800 tons. Pottery clay is also reported to be available in large quantities on paddy lands in Changanacherry, in Travancore. It is stated that clay used for making bricks, tiles and pottery is met with in parts of Pudukottai. In Anantapur and Chingleput bangle-earth is found in quantity. The manufacture of bricks and tiles is carried on in Malabar at Calicut and Tirivaloy, clays being obtained from river beds of neighbourhood. At Mangalore in South Canara a large brick and tile factory is carried on by the Basel Mission. There are said to be some eleven factories in the district which turn out bricks, tiles and pottery.—*Prov. Index (Madras), pp. 23, 24.*

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CENTRAL PROVINCES.

Central Provinces.—The most famous clay of these provinces is that of Hoshangabad, especially near Sohagpur. In 1897 it is estimated that the amount utilized in the manufacture of *surais* and other earthen vessels came to 19 tons, valued at ₹7.

Clay is used for pottery manufacture by Messrs. Burn & Co., Jabalpur. No returns are given, but the white clays are ground in mills and separated by elutriation before being used. (For further particulars regarding the use of clay in this part of India attention should be drawn to the "Industrial monograph on the pottery and glassware of the Central Provinces;" 1895, written by H. Jowers, Esq., I.C.S.)

RAJPUTANA.

Rajputana and Central India.—In addition to the particulars recorded above under fuller's earth, it may be said that Meywar reports chalk and various kinds of clay for brick, fine pottery and building purposes in many places within the State. Good brick clay also occurs. In Ajmir-Merwara the quantity of clay produced has been returned as (1894) 22,832 tons, valued at ₹2,238, (1895) 23,910 tons, valued at ₹2,350, (1896) 8,266 tons, valued at ₹790 and (1897) 2,790 tons, valued at ₹235. The production for Bikanir during 1897 is 34,784 tons, value ₹35,980. In Bundelkand the outturn (1896) of yellow clay was 65 tons, valued at ₹912, and that for 1897, 43 tons, valued at ₹602. In Rewah, it is said 15 mines for clay exist, the produce of which in 1895 was valued at ₹1,500. The three mines in Kothi leased out for ₹500. There are also 3 mines in Sohwal, which have been leased out for ₹240. Nagoda produced 80 maunds, valued at ₹25, while in Barundha the production was 134 tons, value ₹375.

BERAR.

Berar.—The production of clay in this province during 1895 was stated to have been 420 tons, valued at ₹210. Figures supplied for 1896 gave outturn of 670 tons, valued at ₹335. The production for 1897 is reported to have been 420 tons, value ₹210. Clay is confined to the production of bricks and tiles used entirely for local purposes, and there is no trade outside the province in these articles. The pottery industry is very limited, and the articles manufactured are of the poorest description, designed entirely for household purposes.

MYSORE.

Mysore.—The following statements of clays produced in this state have been furnished:—

	1896.		1897.	
	Estimated Quantity.	Value.	Estimated Quantity.	Value.
	Cwt.	₹	Cwt.	₹
Bangalore	851,560	58,315	611,340	50,480
Kolar	416,000	52,000	496,000	81,300
Tumkur	77,150	6,460	67,220	1,398
Mysore	1,646,130	10,288	4,499,440	14,061
Hassan	125,680	10,150	144,000	8,950
Simoga	71,400	1,126	71,800	1,125
Kadur	236,900	36,175	242,120	37,805
Chitaldrug	333,200	13,080	357,000	13,887
TOTAL	3,758,020	1,87,594	6,488,920	2,09,006

COORG.

Coorg.—The estimated production in 1897 of clays, stated to be used for manufacture of tiles and bricks, has been returned at 1,800 tons, the value of which is not given.

BURMA.

Burma.—The estimated productions of clays for the past two years are shown in the following table:—

	1896.		1897.	
	Estimated Quantity.	Value.	Estimated Quantity.	Value.
	Tons.	₹	Tons.	₹
Hanthawaddy	73,435	73,435	119,520	1,19,520
Pegu	2,619	3,274	7,337	9,275
Tharrawaddy	45,817	64,192	31,796	44,515
Prome	4,063	4,063	9,920	9,920
Pakokku	564	3,956	490	3,045
Minbu	3,254	1,446	5,123	3,664
Magwe	3,239	5,074	2,980	4,665
Myingyan	4,522	6,042	4,904	5,151
Myitkyina	...	...	2,515	440
Shwebo	...	...	270	84
Lower Chindwin	...	...	10,607	975
TOTAL	137,513	1,61,482	195,462	2,01,254

The increased production is stated to have been due to the general failure of crops which compelled cultivators to resort to pottery-making to earn their living.

178. ***OUTTURN.***—Statistics of outturn during 1896 and 1897 were available for the following provinces only :—

	1896.		1897.	
	Value. ₹	Quantity. Tons.	Value. ₹	Quantity. Tons.
Madras . . .	Not stated.	381,085	Not stated.	398,785
Bengal . . .	Ditto.	69,037*	Not complete.	44,969*
Burma . . .	1,61,482	137,513	2,01,254	195,462
Coorg . . .	Not stated.	1,925	Not stated.	1,800
Rajputana . . .	65,987†	38,755	35,980†	34,784
Ajmir-Merwara . .	790	8,266	235	2,790
Mysore . . .	1,87,594	187,901	2,09,006	3,24,446
Central Provinces .	Not stated.	58‡	7	19‡
Berar	335	670	210	420
Central India . .	2,286	193	977	177
TONS. .		825,403		1,003,652

* Returns from the Burdwan, Muzaffarpur, Balasore and Puri districts.
† Outturns of Jeysalmir and Bikanir States.
‡ „ „ Hoshangabad district.

There are in India some 87 pottery works and 33 tile and cement manufactories. The former give employment to something like 1,964 persons, and the published returns of their manufactures were last year ₹5,72,935, by far the major portion being the Raniganj Pottery Works. The tile and cement works give employment to 5,320 persons, of whom 3,517 are permanently employed, and they turn out goods which in 1896 were valued at ₹6,39,794.

XXXII.—GRANITE (*Bhurbhura patthar*, HIND. ; *Kyaukhnanbat*, BURM.).

179. ***OCCURRENCE.***—In these returns the term granite is employed for all massive crystalline rocks, such as granite proper, gneiss, etc. Rocks of that nature occur plentifully in Western Bengal, in the Madras Presidency, and in the Central Himalaya. Granite appears to be used exclusively for local purposes. It is less employed than formerly, when it was a favourite stone for monolithic structures. The demand for this stone has, however, increased in the Ganjam and Vizagapatam districts of the Madras Presidency since the East Coast Railway works were opened. Quarrying is briskly carried on all over the district of Cuddapah, where the stone is found in layers at some depth from the surface. It is cut into slabs of required sizes by means of chisels. Granite is also found in Kistna, Bellary, Anantapur, North Arcot, Chingleput, South Arcot, Salem, Coimbatore, Trichinopoly, Madura, Tinnevelly, Nilgiris, Malabar, South Canara, many parts of Cochin and Banganapalle, and in all hilly localities of Travancore, and in some parts of Pudukkottai State.

The following paragraphs have been specially furnished in connection with the returns for 1897 :—

Bengal.—The extent of the occurrence or production of granite cannot be exactly estimated. In Gaya, hills containing granite are scattered over most parts of the district except in the north and north-west. The wages paid for excavating are according to local rates, *viz.*, from 2 to 4 annas. The stone exported in 1897 by rail in the Gaya district amounted to 7,393 tons, worth ₹6,995. At present the industry is slack. In Shahabad the estimated production of granite is 1,863 tons, valued at ₹3,072. The estimated production in the Sonthal Parganas is 47,627 tons and in Puri it is 200 tons. In Manbhum the estimated production of rubble stone is 182 tons, valued at ₹16; and of quartz stone, 7,371 tons, valued at ₹515.

North-West Provinces and Oudh.—Granite occurs in Banda, Hamirpur, Jhansi, Mirzapur and Almora. The quantity quarried in 1895 has been reported at 5,732 tons, in 1896 at 2,063 tons, and in 1897 at 3,655 tons.

Central Provinces.—Granite of good quality occurs in many localities especially in the Jabalpur and Hoshangabad districts. It is dug out by blasting, then broken into small pieces and used for metalling the roads, but occasionally for building purposes. A royalty is realized of 6 annas per 100 cubic feet. Granite also occurs near the head-quarters town of Balaghat. The stone is quarried mostly for Government buildings at a cost varying from ₹50 to ₹70 per 100 cubic feet. This gives the labourer about 2½ annas per day.

Rajputana.—Typical granites are found in the sub-ranges of the Aravallis in Godwar, and hornblende granites are also met with. Kishengarh, Tonk, Kerowlee have nothing further to report than formerly. The returns from Bhurtpur and other states are usually very inaccurate. Production in Tonk during 1897 was 7,088 tons, value ₹1,281, and in Kerowlee 3,254 tons, value ₹663.

Coorg.—Granite is used for metalling the roads and building purposes.

Burma.—PROME.—Occurs in the Shwedaung sub-division and is extracted by the Public Works Department for metalling roads. TONGOO.—The production in 1897 was 1,767 tons, valued at ₹1,730. MINBU.—Produced in the Salin river and in the Sabwet chung, in Salin and Minbu townships, is used by the Public Works Department for metalling roads. The production during the year was 2,400 tons, valued at ₹1,947.

GRANITE.

180. ***OUTTURN.***—The following statement compiled from the returns may be given as the production during 1896 and 1897 :—

	1896. Quantity. Tons.	1896. Value. ₹	1897. Quantity. Tons.	1897. Value. ₹
Bengal	29,948	13,183	64,636	10,598
North-West Provinces and Oudh	2,063	Not stated.	3,655	Not stated.
Central Provinces	Not stated.	Ditto.	Not stated.	Ditto.
Berar	99,761	2,227	...	...
Central India	Not stated.	Not stated.	Not stated.	Not stated.
Rajputana	6,462 *	5,132	10,342	7,944
Ajmir-Merwara	11,745	2,300	6,246	1,260
Madras	442,361	Not stated.	301,323	Not stated.
Bombay	Not stated.	Ditto.	Not stated.	Ditto.
Mysore	210,603	4,24,616	224,116	4,66,521
Coorg	15,648	46,944	9,175	27,525
Burma	3,907	4,706	3,807	3,677
Tons	822,498		623,300	

* Outturns of Tonk and Kerowlee States.

LATERITE.

XXXIII.—LATERITE (*Gawun kyauk*, BURM.).

181. ***OCCURRENCE.***—Laterite occupies an important position in the superficial geology of India and is widely distributed throughout the Peninsula. It is a porous argillaceous rock impregnated with hydrated peroxide of iron.

Bengal.—The estimated production of laterite in Midnapore was 7,318 tons, valued at ₹785. The estimated production in Monghyr is 49,468 tons. In Gaya laterite is found all over the district, but its exact extent is not known. For Cuttack the production came to 55,251 tons, valued at ₹35,701. It has been largely used in canal works as well as for building purposes and metalling roads. The estimated production of laterite in Balasore was 2,560 tons and in Puri it was 484 tons.

Central Provinces.—Is abundant in these provinces as, for example, in Jabalpur and Hoshangabad. It is excavated by manual labour and is used for metalling roads. A royalty of one anna per 100 cubic feet is realized.

Rajputana.—The outturn in Bikanir was last year 69,781 tons, valued at ₹51,346.

Central India.—There is only one mine in the Narayangarh Pargana (Gwalior), but no return has been received of the production.

Madras.—Laterite is reported to occur in Ganjam, Godavari, Kurnool, Bellary, North Arcot, Nellore, Chingleput, Salem, Trichinopoly, Tanjore, Madura, Nilgiris, Malabar, South Canara, and the Travancore and Pudukkottai States. The outturn in the Madras Presidency for 1897 is 5,809,177 tons.

Bombay.—In the Junagadh State, Kathiawar, 1,040 tons of laterite are reported to have been worked during the year.

Coorg.—Laterite is found in large quantities in South Coorg and is used in building and in metalling roads.

Burma.—HANTHAWADDY.—The estimated production in 1897 was 84,050 tons, valued at ₹1,23,368. The variations in the value are due to the different rates at which laterite is valued in different parts of the district. PEGU.—The estimated production in 1897 was 9,530 tons, valued at ₹20,328. PROME.—The estimated production in 1897 was 6,971 tons, valued at ₹3,485. PAKOKKU.—Estimated outturn in 1897 was 1,529 tons, valued at ₹2,383. MINBU.—The production during the year was 7,504 tons, valued at ₹4,488. MAGWE.—The production in 1897 was 2,435 tons, valued at ₹2,461. MAUNGMYA.—Estimated production in 1897 was 1,940 tons, valued at ₹194. TOUNGOO.—Occurs in the Shwegyin sub-division over a large area extending for over half a mile to the north and east of the jail. Quarrying is done by digging with pick-axes and by removing blocks from the earth with crowbars, dressing being done by steel blades fitted on to hammers. The industry is in a flourishing state, and at present an average of 54 cubic feet is extracted daily. The production during the year was 1,352 tons, valued at ₹2,590. AMHERST.—The production in 1897 was 3,188 tons, valued at ₹1,594. SHWEBO.—60 tons were quarried during the year, valued at ₹45. LOWER CHINDWIN.—Is found in places along the banks of the Chindwin, the outturn during the year being 1,368 tons, valued at ₹186. MY:NGYAN.—The production in 1897 was 4,643 tons, valued at ₹5,695.

182. ***OUTTURN.***—The estimated total production in 1896 and 1897 available for the following provinces only :—

	1896. Quantity. Tons.	1896. Value. ₹	1897. Quantity. Tons.	1897. Value. ₹
Madras	5,401,780	Not stated.	5,809,177	Not stated.
Bombay	...	Ditto.	1,040	Ditto.
Bengal	43,040 *	Not complete.	115,021	Not complete.
Burma	51,414	49,050	124,570	166,817
Coorg	149	149	83	83
Mysore	201,750	1,84,569	178,425	1,57,740
Rajputana	74,202	46,903	69,781	51,346
Berar	540	270	620	310
Central Provinces	2,325 †	Not stated.	Not stated.	Not stated.
Tons	5,775,200		6,298,717	

* Does not include gravel.

† From Hoshangabad district only.

XXXIV.—LIMESTONE (*Chúná, phúnkne-ka kankar*, HIND.; *Tonkyauk*, BURM.). LIMESTONE.

183. ***OCCURRENCE.***—Marble (*marmar*), dolomite, serpentine, *kankar*, etc., one or other can hardly be said to be absent from any of the Indian geological formations. They occur in almost all the districts of Madras Presidency. In the Manbhum, Singbhum, Lohardaga, and several other districts of Bengal. In the Khasi and Jaintia Hills, Assam. In the Sambalpur, Raipur, Jabalpur, Nagpur and Wardha districts of the Central Provinces. They are frequent in the Bombay Presidency and Sind, particularly Kathiawar. Limestone is also met with in Burma, Mysore, Coorg, Hyderabad, and Baroda.

The best limestone and marble is probably that met with in the northern part of the Jabalpur district. But good limestone also occurs in the Vindhyan range, in the following Native States in the Central India Agency :—Bundelkhand, Baghelkhand, and Bhopawar ; and in several of the Native States in Rajputana, Makrana being the chief. Within a radius of eight miles around Makrana there are something like one hundred quarries. But of these only some fifteen are at present worked.

The Makrana quarries vary in depth from 30 to 75 feet, and follow the lead of the vein. The marble is excavated by blasting, and is then cut into the required sizes by means of steel saws. It is hauled to the surface on wooden rollers by manual labour, the chips and dust are burnt into chunam, and used for the finer kinds of plastering. The quality of the stone is generally better according to the depth it is worked out, but, owing to the rude appliances used for hoisting it to the surface, it is impossible to work to any great depth. The rates levied by the Marwar Darbar are as follows :—

₹1 per maund up to 10 maunds, and 4 annas per additional $2\frac{1}{2}$ maunds.
₹2 per maund on all articles such as cups and plates cut from the stone.
₹2 per cart-load on coloured marble which is inferior to the white stone.

The revenue derived from the quarries was previously credited to His Highness's privy purse but now goes to the State Treasury. From statistics it would appear that the output is declining, which may be accounted for by bad seasons and the demand having lessened owing to the marble quarries started in the Jaipur State. The railway which has been opened through Makrana will, however, certainly give an impetus to further excavation, unless the opinion that the quarries are nearly worked out, expressed by Mr. Foote, the Geological Superintendent of the Baroda State, be found correct.

The limestones of the Bombay Presidency and Sind, particularly that from Jhalavad Prant and the south-west coast of Kathiawar, are admirably suited for building purposes. The Porbundar miliolite and the grey sandstone of Dhangadra are perhaps the best known. The former has recently been conveyed all the way from Kathiawar to be used in the construction of buildings in Calcutta.

184. ***QUARRIES.—Madras.***—The limestones of this Presidency are, for the most part, collected from the surface ; occasionally they are dug out of the earth. The production in 1897 is given at 761,613 tons.

Bombay.—Limestone is found in Khandesh. The production during 1897 was 674 tons, valued at ₹387.

Bengal.—In Bengal, some of the quarries are worked with pick-axes and blasting, while in others the stone is excavated by hand labour, or dragged up from the beds of rivers. The production of the Sonthal Parganas in 1895 was 7,000 tons ; Cuttack, 35 tons ; and Balasore, 2,411 tons. In 1897 the estimated outturn is stated to have been—Monghyr 2,945 tons ; Burdwan 15,372 tons (used by Bengal Iron and Steel Company) ; Muzaffarpur 14,995 tons, valued at about ₹10,309 ; Cuttack 18,385 tons, valued at ₹16,872 (the returns are probably for lime) ; Balasore 2,400 tons, Puri 1,662 tons and Manbhum 206 tons, valued at ₹510 (probably for lime).

The District Engineer, Saran, reports that the value of lime manufactured in Chupra sub-division was ₹6,000, and in Sewan sub-division it was ₹1,000 for 50,000 cubic feet of lime. It is also reported that 33,751 maunds (1,235 tons) of *kankar* lime, value ₹6,196, manufactured in Chunaway in Gopalgunge sub-division was solely used for the Huthwa Raj works.

185. Limestone in the nodular form known as *kankar* occurs in Bengal and almost all over the North-West Provinces, and is very largely used for making lime and metalling roads. The estimated production in the North-West Provinces and Oudh during 1897 was 618,796 tons, valued at ₹2,22,642. There are fifteen *kankar* quarries in the Muzaffarpur district of Bengal, of which the most important are at Chandrutti, Kudaria, Harawli, and in the bed of the Khanow and Gundak rivers. *Kankar* is found in every *nallah* in the district of Gaya, and is collected by manual labour. The coolies are paid daily at one to two annas. The present state of the industry is brisk. The estimated production in 1897 in Muzaffarpur was 14,995 tons, valued at ₹10,309. In Monghyr the outturn was 2,945 tons, and in Manbhum, 16,602 tons, valued at ₹276. In Darbhanga the estimated production was 3,374 tons, valued at ₹3,150. The *kankar* is situated in the beds of the rivers Bagmatti, Lakhandeo and Boor Gundak. The present state of the industry is reported to be very unsatisfactory, and the supply is not equal to the demand.

In Patna, a coolie earning two annas six pies a day can extract from the bed of the river 3 cubic feet of *kankar* ; the cost of quarrying 100 cubic feet is, therefore, ₹5-3-4.

The estimated production in Cuttack during 1897 is 18,385 tons, valued at ₹16,872. It is considered that these returns are probably for lime. The estimated outturn in Balasore for 1897 is 2,400 tons.

LIMESTONE.

North-West Provinces and Oudh.—The production of *kankar* during 1897 was estimated at 618,796 tons, valued at ₹2,22,642.

Central India.—The production of limestone at Panna was last year 387·85 tons, valued at ₹762. In Rewah one quarry in pargana Madhogarh worked by the Sutna Stone and Lime Company, Limited, who paid ₹1,296 on 499,782 cubic feet of limestone despatched during the year 1897. The quantity produced at Nagode was 637 tons, valued at ₹1,740. Limestone occurs in Bag, Ali Rajpur and Jhabua (Bhopawar).

Kankar is met with in the Gwalior, Baghelkhand, Bag, Ali Rajpur, and Jhabua States of the Central India Agency. The outturn in 1894 was estimated for the Gwalior States at 1,420 tons, value ₹13,616. Returns for 1895 show a valuation of ₹4,395. Figures furnished for 1896 were 29,455 tons, value ₹4,011. The production in 1897 is reported to be 10,585 tons, valued at ₹3,953. In Bhurtpur (Rajputana), this form of lime is regularly collected, but no returns of the amount have been furnished.

RAJPUTANA.

Rajputana.—In addition to the particulars published in former reports as to the limestone of Jaipur, Kishengarh and Jeysalmir, it may be remarked that the stone from Jajia is similar to Dabhla stone. Quarries are 7 *kos* distant from Jeysalmir. Used for the tops of *chatree* and domes of temples and also for floors in buildings in Guzrat and Kathiawar. The production in 1,897 was 1,853 tons and value ₹1,672. The outturn for 1897 in Jaipur and Kishengarh has been returned separately as under:—

JAIPUR—26,309 tons, valued at ₹40,556, quarried during the year.

Limestone, marble, greyish-white and pink, is chiefly obtained in the Dosa district near the village of Rayawala about 36 miles to the north-east of Jaipur. Black marble is found at Bainslana 60 miles north of Jaipur. These marbles are chiefly used for ornamental purposes, statues, toys, etc. The marble is quarried in large and small blocks up to 150 cubic feet. The greyish-white marble has flaws and is inferior to Mekrana marble. These marbles take a good polish and are used for lime plaster. When pure white colour is required and when rubbed over it receives a polish resembling pure marble. Lime for mortar in Jaipur is chiefly prepared from the stone brought from Rahere, 14 miles to the north-east of Jaipur.

KISHENGARH.—Grey marble of an inferior kind is found at Tikaora. The quarries have not been worked for some time. This marble is soft and takes a pretty good polish and some of the Raj Chattries built in honour of the deceased Maharajas of Kishengarh and the balconies and doorways of some buildings are built of this stone. These quarries have long been in disuse and consequently they were as good as lost. They have, however, now been discovered, and it is in contemplation to work them.

Marble of blue and pink colour is found at Narwar. It takes a very good polish and is used for ornamental building purposes. The beautiful chimney pieces in the Mayo College are most of them of this stone. Square slabs of this stone are also used for ornamental floorings.

No return was furnished for 1897, that for 1896 was 500 maunds (18·3 tons).

Kankar is found very generally in Kishengarh, and is used for metalling roads and making chunam.

The largest quantity (81,581 tons) of marble-stone as well as the largest revenue (₹57,013) were obtained in Bikanir. SIROHI.—2,449 tons, value ₹787, found in the vicinity of Morthala siding. Quantity at other places cannot be ascertained on account of contract system. MARWAR.—Total production of marble-stone during 1897 was 330 tons, valued at ₹11,500. Returns were forwarded from nine districts last year and the value of the stone amounted to two lakhs.

TONK.—Production 6,571 tons, value ₹1,785.

ULWAR.—The limestone in Ulwar is excellent. There were two works, and production during 1897 was 27,149 tons, value ₹50,896; 19 persons were employed at wages of 5 annas each. These quarries are worked by contractors, and full particulars are not available as the contractors do not keep proper and regular records.

KOTAH.—Production 45,279 tons, value ₹32,356.

JHALLAWAR.—Production 18,019 tons, value ₹9,319.

CENTRAL PROVINCES.

Central Provinces.—There are in all about fourteen lime factories and almost all of them are at Marwara or Katni. On an average about 40,000 tons of lime are exported yearly at a cost of ₹o-5-6 per maund (total value being about ₹35,000). It is consigned principally to Bengal, North-West Provinces and Oudh, and is chiefly used for building, plastering, whitewashing, disinfecting, and in the manufacture of soap, gas, leather, paper, sugar, manure and is eaten by natives with betel-nut and pán (**Piper Betel**). The lime is manufactured from the hill, or as limestone which is obtained by quarrying at a depth averaging about 30 feet from the surface of the ground. The limestone is so pure that it contains 95¾ per cent. pure carbonate of lime, and is so light that it takes 3¼ cubic feet of slaked lime to weigh one Bengal maund. There are large deposits of marl found along with the limestone which could be worked profitably or converted into Portland Cement. There is a party of European gentlemen now trying to form a company on a large scale to work it. At present about 350 labourers, men, women and children, are employed in the lime factories by Messrs. Cook and Sons earning on an average ₹o-2-3 per day each. The lime is burnt with both wood and coal, the former being used in intermittent or flame kilns, and the latter in perpetual kilns. The wood is obtained from the surrounding country at ₹10 per 100 maunds and the coal from Umaria at ₹4-4 and ₹2-4 per ton. Coal is now supplanting wood in these furnaces.

LIMESTONE.

In Balaghat there are three quarries from which limestone is obtained in moderate quantities and this is used for metalling roads. In the Nagpur district limestone of excellent quality is obtained at Koradi (a village 6 miles distant from Nagpur) at Pipra, a village in the Hingṅa pargana, and in parts of the Umrer tashil. The stone quarried at Koradi is used for whitewashing and sometimes for tombstones.

In Nimar extensive quarries of chalk are worked intermittently by *Baryasks*, but the extraction has fallen off owing to the risk of fire being caused during quarrying operations.

In Hoshangabad limestone occurs all over the district.

BURMA.

Burma.—MYAUNGMYA.—The outturn of burnt lime during the year was 4,397 tons, valued at ₹24,120. BHAMO.—Found in both first and second defiles in large quantities. The extent of occurrence is practically unlimited in quantity, the whole of the defiles being composed of rock, much of which is limestone. In the second defile lime is made from limestone and sold chiefly to the railway. The limestone in the first defile is broken up and used for road-metalling. The industry is reported to be improving. The production in 1896 was 1,044 tons, valued at ₹2,284. SHWEBO.—The outturn in 1897 was estimated at 1,315 tons, valued at ₹986. SAGAING.—The estimated production in 1897 was 2,817 tons, valued at ₹1,517. PAKOKKU.—Limestone exists in the Salé, Seingan, Myaing, Myotha, Chaungsôngyi, and Chauktaung circles of the Myaing township and is quarried from Kyibingôn, and Tanwegan villages. The outturn per kiln is about 200 baskets a month in the dry weather and 100 baskets a month in the rains. The kiln consists of a pit 9 feet deep, with a diameter of 6 feet at the base and 4½ feet at the mouth, and at a height of 3 feet from the bottom, a ridge 6 inches wide and gradually decreasing upwards encircles the pit. At a distance of 10½ feet from the mouth of the pit a hollow passage, 6 feet in diameter, is tunnelled to the bottom of the pit where it meets a fire-hole 1½ feet in diameter. The limestone is quarried in the above mentioned localities and conveyed to the kiln in carts. One cart makes two trips a day to the kiln; once in the morning and once in the evening. A cart-load is estimated at 5 basketfuls. At the end of 5 days, or when 10 cart-loads have been brought to the kiln, the stone is broken up into conveniently-sized lumps and arranged one over the other, on the inner ridge, arch-ways towards the mouth of the pit, which is surrounded with a stone parapet about 3 feet high. Firewood is then taken down the tunnel and placed in the bottom of the pit through the fire-hole and a fire kindled under the limestone. This is kept burning for two or three days, and when the kiln is cool the burnt stone is raked up through the tunnel and 50 or 60 pots of water are emptied on the burnt stones. The water causes the stones to crack and crumble into powder and this powder is lime. The annual outturn from both Kyibingôn and Tanwegan is only 2,500 baskets, and 50 baskets of lime respectively; the outturn of one kiln sells for ₹17 to ₹18. The outturn during the year was 63 tons, valued at ₹380. MINBU.—The production during the year was 6 tons, valued at ₹150. MAGWE.—The production during the year was 1,998 tons, valued at ₹6,858. Fall in price, due to less demand. THAYETMYO.—The outturn in 1897 was 1,360 tons, valued at ₹510. It is reported that the value given in 1894 cannot have been correct as the real value was the same as in 1895. MYINGYAN.—The outturn in 1897 was 86 tons, valued at ₹700. MYITKYINA.—Is found in the Sadôn township. The production during 1897 was 250 tons, valued at ₹1,400. It is worked by the native method. Work stopped owing to completion of the stockade. LOWER CHINDWIN.—Is found on high land about 8 miles to the north-west of Mônywa in the Salingy township and is distributed over a small area. The mineral appears to exist to some extent, the quarries having been worked in Burmese times. There are now two quarries which are being worked. The estimated production of the stone during 1897 was 264 tons, valued at ₹480. The stone is dug from the earth or separated from large masses of rock by means of pickaxes, spades, etc. The kiln for burning the lime is constructed under the ground on a favourable site, generally on the slope of high lands. There are 10 kilns, and one kiln holds eight cart-loads of stone and produces 70 to 100 baskets of lime (paste) at a time. Five or six men are employed at each kiln, and it is said that it takes some days for the men to have a kiln burnt. The industry for the time and labour spent is not a paying one and is in the same state as in former years. KYAUKSE.—Is found extensively scattered through the whole of the hill range running north and south along the east boundary of the district. It is quarried from the hillsides and is carried to the kiln constructed close by, burnt, and carted to the nearest railway station. The amount produced during the year was 518 tons, valued at ₹3,108; this was chiefly supplied for the use of the Public Works Department. The industry is in an initial stage, more or less, and eventually large quantities may be extracted.

ASSAM.

Assam.—There are two centres of production, Lakhimpur and the Khasi and Jaintia Hills. The former yielded last year 1,577 tons, valued at ₹27,670 (selling price at Dibrugarh), and the latter 41,689 tons, valued at ₹58,838 (estimated value at quarry). The limestone is also found in the form of boulders in the bed of the Degaru river at the point where it discharges itself into the Brahmaputra. The following notes have been furnished regarding these Assam limestones:—

LAKHIMPUR.—The Doms, Miris, near Sadiya are the only people who collected stones. They go in boats for the purpose of fishing and collecting limestone for themselves and for Marwari merchants. They return as soon as their boats are fully loaded. They do not reduce the stones to lime, but sell them at Sadiya. Although the quantity of lime collected has not increased during the year, the present state of the industry (if the small operations dealt with deserve this name) is reported to be prosperous. As a matter of fact, however, the local supply cannot compete with that obtained from the Khasi and Jaintia Hills.

LIMESTONE. KHASI AND JAINTIA HILLS.—Some of the quarries are worked under leases issued by Government for various periods, and some under permits issued annually by Government to applicants for quarrying and removing limestone. In some quarries, the limestone is detached by blasting with dynamite and gunpowder, and the boulders are then split and broken with Native crowbars and hammers, while in others no dynamite is used, the limestone being workable without blasting. The outturn in 1897 was adversely affected owing to the effects of the earthquake of the 12th June 1897, which interfered with the removal of the limestone from the Shella and Shohbar quarries. The price rose owing to the limited supply.

It may be remarked that to a very large extent the quarries here dealt with meet the demands of Calcutta for lime.

MANIPUR.—The lime quarries of the State meet all the local demands. Outturn reported for last year, 490 tons, value at quarry ₹1,339. The fall in the price is apparent only. The price reported last year should have been ₹253 for 347 tons.

CEMENT. ***Cement.***—Portland cement, bricks, tiles and concrete pipes are manufactured at Messrs. Arbuthnot & Co.'s works in Madras. During the year 1897, 455 persons were employed daily and 88,963 cwts. of finished material, valued at ₹2,04,600, were made and disposed of.

186. ***OUTTURN.***—The estimated production of limestone during 1896 and 1897 was :—

	1896.		1897.	
	Quantity. Tons.	Value. ₹	Quantity. Tons.	Value. ₹
Madras	698,930	Not stated.	761,613	Not stated.
Bombay	...	...	674	327
Bengal	88,578	21,259†	75,941	31,117
N.-W. Provinces and Oudh	479,257	179,136	618,796	2,22,642
Burma	17,058	39,194	11,076	33,351
Assam	76,346	82,191	43,756	86,847
Mysore	55,404	1,33,228	52,516	1,54,480
Rajputana	187,411‡	2,17,539	289,540	2,05,884
Central India	31,118	18,974	11,610	6,455
Ajmere-Merwara	1,968	272	757	108
Berar	928	832	5,632	6,482
Central Provinces	346*	Not given.	40,000	35,000
Tons	1,637,344		1,831,911	

SANDSTONE.

XXXV.—SANDSTONE (*Red-patthar*, HIND.; *Thekyauk*, BURM.).

187. ***OCCURRENCE.***—Several of the recognized formations in India, *viz.*, the Vindhyan and Gondwana, cretaceous and tertiary, afford sandstones admirably suited for building, and some of them have from very early times been largely drawn upon for the supply of materials for that purpose. The Vindhyan formation stands pre-eminent, its stones having been used for many centuries in the construction of the forts, palaces, and sacred edifices of Dehli, Agra, and Northern India. Sandstone is obtainable in the Ganjam, Vizagapatam, Godavari, Anantapur, Kistna, North Arcot, South Arcot, and Tinnevelly districts of the Madras Presidency; in the Nimar, Chhindwara, Jabalpur, and Saugor districts of the Central Provinces, and in the Agra, Muttra, Jhansi, Hamirpur, Banda, Allahabad, Mirzapur, Dehra Dun, Kumaon, Sultanpur and Garhwal districts of the North-West Provinces. Chunar in the Mirzapur district is particularly famous for its fine sandstone. Sandstone is found in the Manbhum, Shahabad, Monghyr and Cuttack districts of Bengal, in the Baghelkhand and Bhopawar States of the Central India Agency, and in the several States of Rajputana, of which the Tonda hills in Kishengarh produce beautiful quartz crystals, but there is no trade in them. All the hills in Kishengarh belong to the transition series, and supply sandstone for building purposes. Very large and durable slabs and beams are found in certain quarries near the town of Kishengarh. These slabs are greatly prized for roofing purposes, and there is a large trade in them. The quarries are worked by a class of Brahmins called Neharaj or Mohobrahmans. The sandstone quarried in Rajputana during 1897 realized 1·53 lakhs.

Sandstone is also found in the Shwebo and Myingyan districts of Upper Burma and in the Hyderabad State. In Bengal, sandstone is worked by quarrying; the present state of the industry is said to be normal.

The following notes may be given from the provincial reports of 1897 :—

Bengal.—The estimated production in Monghyr is 11,531 tons. No returns have been received regarding the estimated production in the Santhal Parganas. In Manbhum the estimated production of sandstone is 1,153 tons, valued at ₹105. In Cuttack the yield was 16,210 tons, valued at ₹11,971. In Puri it is principally obtained from certain parts of the Khurda sub-divisions. Estimated production is 29 tons.

* Figures for Hosangabad district only.

† Value for 58,162 tons only.

‡ Does not include 18·3 tons quarried at Kishengarh, the value of which is not given.

North-West Provinces and Oudh.—Sandstones are found in Agra, Muttra, Jhansi, Hamirpur, Banda, Allahabad, Mirzapur, Dehra Dun, Almora, Garhwal, and Naini Tal. Chunar in the Mirzapur district is particularly famous for its fine sandstone. The quantity worked in 1895 is estimated at 164,616 tons and in 1896 at 150,818 tons, and in 1897, 119, 423 tons.

Central Provinces.—It is plentiful in Jabalpur district. The stone is extracted by means of blasting, and is then dressed into slabs, tiles, carpings, fencing posts, etc., which are exported in very large quantities to stations on the East Indian and Great Indian Peninsula Railways. Undressed stones are used in the foundations of buildings. A mine in the Jabalpur tahsil has been leased. Sandstone occurs all over Hoshangabad, the production last year having been 189 tons, valued at R284.

Central India.—Reported to occur at Panna in Bundelkhand, and at Nimkhera and Jobat in the Bhopawar Agency. In Panna the outturn in 1897 was 751 cubic feet, or, say, 53 tons, valued at R47. In the Nimkhera Bhumiat, stone worth R72 was sold during the year.

Baroda.—The quantity and value of the sandstone found in Songir hills in Sankheda taluka was last year 1,089 tons, valued at R1,612.

At Songir there are four quarries working out building materials and two are turning out mill-stones. From 200 to 300 persons, including women and children, work in these quarries in the open season. The wages ordinarily paid are annas 3 per man, annas 2 per woman and anna 1-6 per boy or girl. Those employed in blasting earn annas 6 a day, and those who prepare mill-stones earn annas 8. There is also a stone quarry at Motipura. The dimensions of it are 500 feet long and 150 feet wide, and the excavation extends to a depth of 15 feet. Twenty-six thousand seven hundred and fifty-five cubic feet of green marble and 36,665 cubic feet of ordinary stone are stated to exist at an approximate value of R55,343.

Rajputana.—MARWAR.—Total production during 1897 was 20,810 tons, valued at R2,140.

JEYSALMIR.—The production in 1897 was 232 tons, valued at R1,300.

JAIPUR.—Quantity (tons) produced 32,862, value R25,911. Sandstone is obtained in the Hindon district, it can easily be cut and is well suited for carving; traceries, and balustrades are generally made of this stone. It can also be had in large pieces like the Rayawala marble, and can be split in slabs of any thickness.

KISHENGARH.—Beautiful quartz crystals are found in the Tonkra Hills but there is no trade. All the hills in Kishengarh belong to the transition series and supply sandstone for building purposes. Very large and durable slabs and beams are found in the Silora and Oodeypur quarries near the town of Kishengarh, measuring up to 30 feet long by 2 to 3 feet wide and a foot or more in thickness. These slabs are greatly prized for roofing purposes and there is a great trade in them, the slabs being in great demand not only in Ajmere and Sambhar, but even as far away as Shekhawati, Jaipur and Marwar. A slab 2 feet long by 1 foot 9 inches broad by 13 inches in thickness, sells for R13 on the spot, which comes to about 5 annas per cubic foot. These quarries are worked by a class of Brahmins. The cartmen who carry these stones from the quarries to the Railway station or to other places, also belong to the same caste as the quarrymen and earn about a rupee a day. There are quarries also at Jhag in the Rupnagar district, which supply very good pillars, doorways, etc. The total value of the produce of the Silora, Oodeypur and Jhag quarries, which are about 250 in number, is approximately R25,000 per annum.

DHOLPUR.—Production 5,500 tons, value R16,947.

KEROWLEE.—Production 514 tons, value R1,509.

BHURTPUR.—Production 10,000 tons, value R25,000 (outturn of financial year 1896-97). There is an inexhaustible supply of laminated sandstone at the quarries which are about 25 miles from Bhurtpur city. The stone is red, white and speckled. It is quarried in massive slabs which can be split to any required size. The value shown corresponds to the royalty received by the State for stone quarried and sold; it does not include the cost of quarrying, carrying, etc., and stone quarried free for State use has not been valued.

ULWAR.—There were 54 works which produced 52,719 tons, valued at R39,723. Four hundred and eighty-five persons were employed, at wages 4 annas each.

KOTAH.—Production 19,750 tons, value R15,572.

JHALLAWAR.—Production 16,435 tons, value R22,060.

BIKANIR.—Production 885 tons, value R3,644.

Madras.—Sandstone is obtainable in the Ganjam, Vizagapatam, Godavari, Anantapur, Kistna, North Arcot, South Arcot and Tinnevelly districts. Available in large quantities in ten villages over an area of 30 square miles in the Sivaganga zemindari of Madura. The production in 1897 is given at 606,768 tons.

Burma.—SHWEBO.—The estimated production in 1897 was 4,284 tons, valued at R5,355.

MYINGYAN.—The estimated outturn was 20 tons, valued at R20, the same as last year.

MINBU.—Produced in the hills west of Minbu. Large quantities can be had, but the production during the year was limited to 4,597 tons, valued at R3,398. There is no special method of working this mineral. It is used chiefly by the Public Works Department for metalling roads.

PAKÔKKU.—Is found in the Yesagyo township over an area of half a square mile. The stone is quarried in large blocks from the hill-side and is fashioned by friction into slabs for flooring and building, coping for wells, etc. During the year the production was estimated at 488 tons, valued at R3,080; the fall in value was due to scarcity in 1896.

SANDSTONE. KYAUKSE.—The stone extracted is solely for the Public Works Department and Railway for metalling roads, making culverts, etc. It consists of sandstone and a kind of bastard granite. Most of it is quarried in Kyauksè and Bilin hills. The production during the year was 8,118 tons, valued at R22,696.

188. ***OUTTURN.***—The estimated production in 1896 and 1897 was :—

	1896. Quantity. Tons.	1896. Value. R	1897. Quantity. Tons.	1897. Value. R
Madras	531,367	Not stated.	606,768	Not stated.
Bengal	25,495*	Not complete.	28,932	Not complete.
North-West Provinces and Oudh	150,818	Not stated.	119,423	Not stated.
Central Provinces	232†	Ditto.	189	284
Burma	3,627	10,269	17,507	34,549
Ajmere-Merwara	2,202	1,205	8,282	4,225
Mysore	51,412	25,732	563	404
Rajputana	219,130	2,82,897	159,707	1,53,806
Central India	30	26	53	47
Baroda	1,165	1,954		
Tons	985,478		941,424	

GRAVEL.

XXXVI.—GRAVEL and RUBBLE (*Kyauksayit*, BURM.).

189. In one or two of the provincial returns the production of gravel is quoted for the most part along with laterite, other instances under sandstone or trap. It is thus impossible to be sure of the accuracy in separating these, and it would seem desirable that in future returns gravel and rubble should be given independently of the nature of the rocks from which they may have been derived. Roughly speaking, gravel and rubble are naturally formed metalling stones mixed with sand.

Of Bengal it was stated that the production of gravel in 1897 came to 16,704 tons, valued at R15,742. So again under sandstone Bengal returns 16,725 tons of rubble, valued at R5,473.

Burma furnishes the following particulars of gravel :—PAKÔKKU.—Gravel, including stone for metalling, is obtained from a low range of hills about 1 mile to the north of Pakôkku town. The quarries are scattered among the hills to about 2 miles north-west of the town. The gravel is excavated and placed in carts as it is required and the supply is unlimited. The cost of excavating is about R1 per ton. Very little of this metalling material is used and the industry is not flourishing. Returns for 1897 show a production of 226 tons, valued at R226.

LOWER CHINDWIN.—Is obtained throughout the district. The production during the year was 6,153 tons, extracted at various places by Public Works Department contractors for metalling roads. The method of working is by excavation. The present state of the industry is stagnant as there are only a few contractors who extract gravel for the Public Works Department.

MYINGYAN.—Is found in almost every part of the district where there is laterite, though large quantities can be had, it is only used by the Public Works Department for metalling roads. There is no special method of working this mineral, the quarrying being done with pick-axes. The estimated outturn was 715 tons, valued at R715. The state of the industry is limited by the demand of the Public Works Department only.

SLABSTONE.

XXXVII.—SLABSTONE.

190. ***OCCURRENCE.***—Is met with in the Gulburga district of the Nizam's Dominions. The estimated production for 1894 is valued at R3,950 ; in 1895, R2,870 ; in 1896, R2,922 ; and in 1897, R2,561 ; the quantity cannot be given, as the working of the quarries is on contract.

SLATE.

XXXVIII.—SLATE (*Shail*, HIND.).

191. ***OCCURRENCE.***—Slate occurs in the Cuddapah, Kistna, and Kurnool districts of the Madras Presidency. There are no true slates in the Madras Presidency, that is, approaching the roofing slates of commerce. Slabby slates are procurable, but not of large size. Occasionally slaty flags of tolerable size are obtainable. *Prov. Index* (*Madras*), *p.* 35. Samples of slate are found near the villages of Mohari and Belgoa in the Saugor district of the Central Provinces in the vicinity of the Cawnpur road. In the Bagalkote taluq of Bijapur a hard rock occurs, which is prized as a building stone. Slate is also found in Jamalpur and Dhararah hills near Monghyr and in the Kymore hills in Shahabad (Bengal) ; in the Banda, Jhansi, Dehra Dun, Kumaon, and Garhwal districts of the North-West Provinces ; in the Simla and the Kangra districts of the Panjab ; and in the Jaipur, Ulwar, and Dholpur States of Rajputana. Metamorphic black slate is stated to occur in the Nemkhara Bhumiat in the Bhopawar States of the Central India Agency.

The stone is used for building, flagging and other masonry structures, but not extensively, as it cannot be easily split into thin slabs.

The following passages may be given from the provincial returns of 1897 :—

Bengal.—The estimated production in Monghyr is 750 tons.

* Does not include rubble.

† Hoshangabad district only.

SLATE.

Central Provinces.—A quarry exists near the village of Kuan in Jabalpur district, but has not as yet been regularly worked.

Rajputana.—Quarries exist in Jaipur, Ulwar, Bundi, Tonk, and Dholpur. In Jaipur 9,208 tons, valued at ₹30,827, were quarried during the year 1897. In Bundi the production was 5,120 tons, valued at ₹8,750, and in Tonk it was 2,800 tons, valued at ₹831.

Central India.—Metamorphic black slate occurs in Nemkhera, Bhopawar State.

192. ***OUTTURN.***—The estimated production in 1895 and 1896 has been furnished for the following:—

	1896.		1897.	
	Quantity. Tons.	Value. ₹	Quantity. Tons.	Value. ₹
Madras	5,333	Not stated.	8,291	Not stated.
Bengal	1,068	Ditto.	750	Ditto.
Mysore	Not stated.	Ditto.	*Nil*	*Nil*
Rajputana	15,724	38,833	17,128	40,408
Tons	22,125		26,169	

XXXIX.—TRAP.

TRAP.

193. ***OCCURRENCE.***—This section has been made to include basalt and other massive compact crystalline black or dark-coloured rocks, and occurs chiefly in the Bombay Presidency, Western Bengal, and the Central Provinces, where samples of trap are found all over the Nagpur, Saugor, and Mandla districts. The mines at Jamalpur and Dhararah hills in Bengal are worked by Messrs. Stevens, Ambler & Co. It is also found in the Godavari, Kistna, and Trichinopoly districts of the Madras Presidency, and in the north and south-western parts of His Highness the Nizam's Dominions. In Jhabua territory, Bhopawar, Central India Agency, trapstone is said to be used for building purposes, but returns of production are not given.

The following passages may be quoted from the provincial returns for 1897 :—

Bengal.—In the Sonthal Parganas the estimated outturn of trap is 15,596 tons. The estimated production in Manbhum is 964 tons, valued at 131 (?). In the previous year the production was 797 tons, valued at ₹1,446.

In Bhagalpur division 9,500 tons of trap was quarried by the Rajmahal Stone Company during the year.

Madras.—Found in one village in the Kalla Kurchi taluq, South Arcot district, but not used for any purpose. It also occurs in the Godavari, Kistna and Trichinopoly districts.

Mysore and Coorg.—Used for metalling roads.

Rajputana.—BHURTPUR.—A kind of trap is used as a building stone, but the value *in situ* is inappreciable.

JAIPUR.—Trap is found in some places as in the hills near Gunwar, but is difficult to work. The stone generally found is quartz ore sandstone or quartzite, and is chiefly used in building purposes.

Central India.—Trap is found in many parts of this Agency. There is excellent building stone at Burwani, and at Dhar there is a good red building stone.

Burma.—SHWEBO.—Is found in the Okpo and Wetphyu hills in Shwegyin township. The supply is plentiful and is found and collected on the surface; 190 tons were extracted during 1897, valued at ₹143.

194. ***OUTTURN.***—The outturn during 1896 and 1897 is available for the following provinces only :—

	1896.		1897.	
	Quantity. Tons.	Value. ₹	Quantity. Tons.	Value. ₹
Madras	8,827	Not stated.	7,561	Not stated.
Bengal	5,885	Not complete.	26,060	Not complete.
Berar	91,509	21,537	104,694	78,126
Mysore	35	250	35	250
Burma	...		190	143
Tons	106,256		138,540	

XL.—OTHER KINDS.

OTHER KINDS.

195. ***OCCURRENCE.***—The returns furnished under this heading include what are designated as jungle and rough stone, hard stone, blue stone, and white stone, etc. The estimated production during 1896 and 1897 was as follows:—

	1896.		1897.	
	Quantity. Tons.	Value. ₹	Quantity. Tons.	Value. ₹
Madras	35,764	Not stated.	22,212	Not stated.
Berar	Return blank.	Return blank.	Return blank.	Return blank.
Central India	18,410	9,486	16,991	8,717
Rajputana	17,315	1,881	14,655	8,866
Ajmir-Merwara	55*	375	60	486
Mysore	7,223	11,698	35,014	12,937
Tons	78,767		88,932	

* Estimate for Ghantah quarries in Sawar (Kekri Circle).

STATEMENT No. I.

Showing the Production of the Minerals (Salt, Coal, Iron, and Petroleum) for which Statistics are available for the Calendar year 1897.

LIBRARY OF THE BOMBAY BRANCH OF THE ROYAL ASIATIC SOCIETY.

STATEMENT No. I.

Showing the Production of Minerals for which Statistics are available for the Calendar year 1897.

SALT.

Province.	1897.		1896.		Average of the three years, 1894 to 1896.		Percentage on weight of increase or decrease in 1897, compared with	
	Weight in tons.	Value.	Weight in tons.	Value.	Weight in tons.	Value.	1896.	Average of 1894 to 1896.
British Provinces.		₹		₹		₹		
Madras . . .	240,796	*13,60,170*	347,545	*20,01,968*	333,650	*19,30,151*	—30·71	—27·82
Bombay, including Sind .	404,374	*12,95,230*	351,366	*11,06,093*	403·004	*14,95,626*	+15·08	+0·33
Bengal	7,255	*50,540*	8,507	*59,636*	8,309	*59,753*	—14·71	—12·68
North-West Provinces and Oudh.	1,476	*11,190*	1,152	*9,154*	1,203	*11,446*	+28·12	+22·69
Panjab	78,379	*3,62,600*	114,650	*5,56,223*	108,425	*4,94,933*	—31·63	—27·71
Central Provinces . .	...	...	...	...	...	...	...	...
Assam	....	...	...	...	...	...	...	...
Burma	21,895	*8,21,250*	*17,548	*6,77,890*	18,103	*7,16,174*	+24·77	+20·94
Aden	43,828	*2,59,798*	44,311	*2,62,757*	43,346	*2,56,930*	—1·09	+1·11
Total .	798,003	*41,60,778*	885,079	*46,73,721*	916,040	*49,65,013*	—9·83	—12·88
Native States.								
Mysore	...	...	...	...	...	...	...	...
Kashmir . . .	...	..	1	*40*	...	*37*	...	...
Baluchistan . . .	...	...	...	...	...	...	...	...
Central India Agency (Gwalior).	†1,049	*Not stated*	1,049	*Not stated.*	785	*Not stated.*	...	...
Rajputana States . .	118,474	*6,66,160*	135,057	*7,54,757*	241,043	*16,01,085*	—12·27	—50·84
Cutch and Kathiawar .	5,592	*49,360*	5,741	*61,025*	4,833	*52,041*	—2·59	+15·70
Nizam's Dominions .	...	...	...	...	...	...	...	...
Total .	125,115	*7,15,520*	141,848	*8,15,822*	246,661	*16,53,163*	—11·79	—49·35
Total British Provinces and Native States.	923,118	***48,76,298***	1,026,927	***54,89,543***	1,162,701	***66,18,176***	—10·10	—20·60

* The figures published in last year's review were 17,365 tons, valued at ₹6,67,631, but these were subsequently corrected as above.
† The return for 1897 not having been received, the same figure for 1896 has been shown for 1897.

STATEMENT No. I.

Showing the Production of Minerals for which Statistics are available for the Calendar year 1897.

COAL.

PROVINCE.	1897.		1896.		Average of the three years, 1894 to 1896.		Percentage on weight of increase or decrease in 1896, compared with	
	Weight in tons.	Value.	Weight in tons.	Value.	Weight in tons.	Value.	1896.	Average of 1894 to 1896.
British Provinces.		₹		₹		₹		
Madras . . .	...	...	...	...	...	...	...	...
Bombay, including Sind.	...	...	...	...	...	...	...	...
Bengal . . .	3,142,497	*79,15,781*	3,037,920	*81,46,411*	2,596,669	*76,76,331*	+3·44	+21·02
North-West Provinces and Oudh.	...	...	1,000	*Not stated.*	...	...	...	...
Panjab . . .	92,792	*7,75,434*	79,017	*6,59,640*	72,659	*5,90,301*	+17·43	+27·70
Central Provinces .	131,629	*6,16,456*	141,185	*6,67,289*	134,818	*6,48,627*	−6·76	−2·36
Assam . . .	185,533	*12,89,897*	177,259	*12,35,052*	173,141	*12,09,793*	+4·66	+7·15
Burma . . .	11,472	*73,851*	22,993	*1,01,455*	17,464	*1,01,847*	−50·10	−34·31
Total .	3,563,923	*1,06,71,419*	3,459,374	*1,08,09,847*	2,994,751	*1,02,26,899*	+3·02	+19·00
Native States.								
Mysore . . .	...	...	...	...	...	...	...	...
Kashmir . . .	...	...	...	...	...	...	...	...
Baluchistan . .	8,876	*1,20,089*	10,572	*1,48,555*	18,443	*2,41,911*	−16·04	−51·87
Central India Agency	124,778	*3,95,655*	115,386	*3,82,485*	122,234	*4,14,145*	+8·13	+2·08
Rajputana States .	...	...	...	...	...	...	...	...
Nizam's Dominions .	365,550	*12,79,425*	262,681	*9,19,383*	265,373	*9,28,807*	+39·15	+37·74
Total .	499,204	*17,95,169*	388,639	*14,50,423*	406,050	*15,84,863*	+28·44	+22·94
TOTAL BRITISH PROVINCES AND NATIVE STATES.	4,063,127	***1,24,66,588***	3,848,013	***1,22,60,270***	3,400,801	***1,18,11,762***	+5·59	+19·47

STATEMENT No. I.

Showing the Production of Minerals for which Statistics are available for the Calendar year 1897.

IRON ORES.

Province.	1897.		1896.		Average of the three years, 1894 to 1896.		Percentage on weight of increase or decrease in 1897, compared with	
	Weight in tons.	Value.	Weight in tons.	Value.	Weight in tons.	Value.	1896.	Average of 1894 to 1896.
British Provinces.		₹				₹		
Madras . . .	1,011	*1,277*	2,296	*1,920*	2,707	*1,950*	—55·96	—62·65
Bombay, including Sind .	...	...	...	...	...	...	...	...
Bengal	36,280	*65,696*	6,120	*11,965*	21,028	*63,250*	+492·81	+72·53
North-West Provinces and Oudh . . .	...	...	...	...	...	...	...	...
Panjab	4	*28*	11	*39*	20	*173*	—63·63	—80·00
Central Provinces . .	2,387	*5,517*	1,827	*4,614*	4,722	*11,217*	+30·65	—49·44
Assam	...	...	...	...	...	...	...	...
Burma	...	...	...	...	...	...	...	...
Total .	39,682	*72,518*	10,254	*18,538*	28,477	*76,590*	+287·18	+39·34
Native States.								
Mysore	1,094	*9,172*	1,119	*8,028*	1,142	*8,948*	—2·23	—4·20
Kashmir . . .	...	...	...	...	...	...	...	...
Baluchistan . . .	...	...	...	...	...	...	...	...
Central India Agency .	1,364	*38,479*	1,771	*44,889*	2,369	*82,986*	—22·98	—42·42
Rajputana States . .	1,174	*30,410*	632	*15,470*	753	*34,925*	+85·75	+55·90
Nizam's Dominions .	Not given	*1,721*	Not given	*1,975*	...	*2,297*	...	...
Total .	3,632	*79,782*	3,522	*70,362*	4,264	*1,29,156*	+3·12	—14·82
Total British Provinces and Native States.	43,314	***1,52,300***	13,776	***88,900***	32,741	***2,05,746***	+214·41	+32·29

STATEMENT No. I.

Showing the Production of Minerals for which Statistics are available for the Calendar year 1897.

PETROLEUM.

Province.	1897.		1896.		Average of the three years, 1894 to 1896.		Percentage on quantity of increase or decrease in 1897, compared with	
	Quantity in gallons.	Value.	Quantity in gallons.	Value.	Quantity in gallons.	Value.	1896.	Average of 1894 to 1896.
British Provinces.		R		R		R		
Madras	...	...	...	...	...	...	...	...
Bombay, including Sind .	...	...	...	...	...	...	...	...
Bengal	...	...	...	...	...	...	...	...
North-West Provinces and Oudh.	...	...	...	...	...	...	...	...
Panjab	2,041	275	2,364	337	1,888	366	−13·66	+8·10
Central Provinces . .	...	...	...	...	...	...	...	...
Assam	(a) 222,077	(b) 22,208	238,730	23,873	147,356	21,513	−6·97	+50·70
Burma	18,904,710	22,41,289	14,816,000	17,69,145	12,904,315	14,53,880	+27·59	+46·49
Total .	19,128,828	22,63,772	15,057,094	1,793,355	13,053,559	14,75,759	+27·04	+46·54
Native States.								
Mysore	...	...	...	...	...	...	...	...
Kashmir . . .	...	...	...	...	...	...	...	...
Baluchistan . . .	...	...	...	...	...	...	...	...
Central India Agency .	...	...	...	...	...	...	...	...
Rajputana States . .	...	...	...	...	...	...	...	...
Nizam's Dominions .	...	...	...	...	...	...	...	...
Total .	...	...	...	...	...	...	...	...
Total British Provinces and Native States.	19,128,828	22,63,772	15,057,094	17,93,355	13,053,559	14,75,759	+27·04	+46·54

(*a*) The decrease in the quantity and value is partly due to the fact that the Assam Oil Syndicate, which extracted a small quantity of oil in 1896, did not work in 1897, and partly to ordinary fluctuation.
(*b*) Value of the crude or unrefined oil at the well.

Weights and Values of the Salt, Coal, Iron and Petroleum carried by Rail and River in British India between 1st April 1896 and the 31st March 1897.

Weight of Salt carried by Rail and River in British

IMPORTED

Salt.	British Provinces (excluding Chief Seaports).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
Quantity.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
British Provinces (excluding Chief Seaports).										
From—										
Madras . . .	...	20	...	261,082	...	...	...	...	...	261,102
Bombay . . .	130,825	...	...	...	411,059	17	1,238,215	379,473	...	2,159,589
Sind	...	...	...	...	...	1,467	...	...	...	1,467
Bengal . . .	2	...	...	...	5,283	...	208	...	67,776	73,269
North-West Provinces and Oudh.	81	16	...	2,588	...	3,664	3,692	33	...	10,074
Panjab . . .	...	...	10,876	103,960	310,575	...	10	...	...	425,421
Central Provinces .	...	25	...	6,657	2,316	...	...	31	...	9,029
Berar . . .	...	59	...	...	...	...	845	...	...	904
Assam . . .	...	...	...	832	...	...	...	...	...	832
Total .	*130,908*	*120*	*10,876*	*375,119*	*729,233*	*5,148*	*1,242,970*	*379,537*	*67,776*	*2,941,687*
Native States.										
From—										
Rajputana and Central India.	...	880	...	6,064	3,022,954	273,464	104,747	...	...	3,408,109
Nizam's Dominions .	...	2,689	...	...	...	...	...	188	...	2,877
Mysore . . .	22	422	...	...	...	...	...	...	...	444
Total .	*22*	*3,991*	...	*6,064*	*3,022,954*	*273,464*	*104,747*	*188*	...	*3,411,430*
Chief Seaports.										
From—										
Madras Ports . .	1,993,131	272	...	...	...	...	...	...	...	1,993,403
Bombay . . .	3,814	18,699	...	8	17	47	10,166	5,821	...	38,572
Karachi . . .	...	...	207,167	...	...	232	...	...	...	207,399
Calcutta . . .	...	...	...	7,895,596	416,451	65	216	...	574,526	8,886,854
Total .	*1,996,945*	*18,971*	*207,167*	*7,895,604*	*416,468*	*344*	*10,382*	*5,821*	*574,526*	*11,126,228*
Grand Total in Maunds	*2,127,875*	*23,082*	*218,043*	*8,276,787*	*4,168,655*	*278,956*	*1,358,099*	*385,546*	*642,302*	*17,479,345*
Grand Total in Tons	77,880	845	7,980	302,930	152,573	10,210	49,707	14,111	23,508	639,744

IN SALT.

India between 1st April 1896 and 31st March 1897.

INTO											
Native States.				Chief Seaports.					Grand Total.		Salt.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.			
Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Tons.	Quantity.
											British Provinces (excluding Chief Seaports).
											From—
...	137,760	9,413	147,173	60,905	...	...	...	60,905	***469,180***	17,172	Madras.
399,098	606,428	346,811	1,352,337	...	945	...	...	945	***3,512,871***	128,571	Bombay.
...	...	...	...	...	...	...	...	...	***1,467***	54	Sind.
...	...	...	...	...	...	...	424	424	***73,693***	2,697	Bengal.
57,196	...	...	57,196	...	...	...	48	48	***67,318***	2,464	North-West Provinces and Oudh.
101	3	...	104	...	...	64	616	680	***426,205***	15,599	Panjab.
8,913	7	...	8,920	...	3	...	...	3	***17,952***	657	Central Provinces.
...	...	...	...	...	...	...	...	...	***904***	33	Berar.
...	...	...	...	...	...	...	...	...	***832***	30	Assam.
465,308	*744,198*	*356,224*	*1,565,730*	*60,905*	*948*	*64*	*1,088*	*63,005*	***4,570,422***	167,277	Total.
											Native States.
											From—
...	...	...	...	...	...	...	...	...	***3,408,109***	124,737	Rajputana and Central India.
...	...	...	...	...	...	...	...	...	***2,877***	105	Nizam's Dominions.
...	...	...	...	...	...	...	...	...	***444***	16	Mysore.
...	...	...	...	...	...	...	...	...	***3,411,430***	124,858	Total.
											Chief Seaports.
											From—
...	7,233	54,521	61,754	...	...	...	...	...	***2,055,157***	75,219	Madras Ports.
13	61,922	11,026	72,961	1	...	...	...	1	***111,534***	4,082	Bombay.
...	...	...	...	...	...	...	...	...	***207,399***	7,591	Karachi.
...	...	...	...	...	...	...	...	...	***8,886,854***	325,259	Calcutta.
13	*69,155*	*65,547*	*134,715*	*1*	...	...	...	*1*	***11,260,944***	412,151	Total.
465,321	*813,353*	*421,771*	*1,700,445*	*60,906*	*948*	*64*	*1,088*	*63,006*	***19,242,796***	...	Grand Total in Maunds.
17,031	29,768	15,437	62,236	2,229	35	2	40	2,306	...	704,286	Grand Total in Tons.

Value of Salt carried by Rail and River in British

IMPORTED

SALT.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
VALUE.	₹	₹	₹	₹		₹		₹	₹	
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras . . .	...	65	...	8,48,517	...	...	...	...	...	8,48,582
Bombay . . .	4,66,064	...	...	...	14,64,397	60	44,11,141	13,51,873	...	76,93,535
Sind	...	...	...	...	...	4,584	...	...	...	4,584
Bengal . . .	7	...	...	...	18,490	...	728	...	2,37,216	2,56,441
North-West Provinces and Oudh.	294	58	...	9,381	...	13,282	13,383	120	...	36,518
Panjab . . .	...	...	35,347	3,37,870	10,09,369	...	32	...	...	13,82,618
Central Provinces .	...	100	...	26,628	9,264	...	...	124	...	36,116
Berar . . .	...	206	...	...	...	...	2,958	...	...	3,164
Assam . . .	...	...	...	2,912	...	...	...	...	...	2,912
Total .	*4,66,365*	*429*	*35,347*	*12,25,308*	*25,01,520*	*17,926*	*44,28,242*	*13,52,117*	*2,37,216*	*1,02,64,470*
Native States.										
From—										
Rajputana and Central India.	...	3,135	...	21,224	1,09,58,208	8,88,758	4,18,988	...	...	1,22,90,313
Nizam's Territory .	...	9,580	...	...	...	...	...	658	...	10,238
Mysore . . .	71	1,503	...	...	...	...	...	...	...	1,574
Total .	*71*	*14,218*	...	*21,224*	*1,09,58,208*	*8,88,758*	*4,18,988*	*658*	...	*1,23,02,125*
Chief Seaports.										
From—										
Madras Ports . .	64,77,676	884	...	...	...	...	...	...	...	64,78,560
Bombay . . .	13,587	66,615	...	29	61	168	36,216	20,737	...	1,37,413
Karachi . . .	...	...	6,47,397	...	...	725	...	...	...	6,48,122
Calcutta . . .	...	...	...	2,76,34,586	14,57,578	227	756	...	20,10,841	3,11,03,988
Total .	*64,91,263*	*67,499*	*6,47,397*	*2,76,34,615*	*14,57,639*	*1,120*	*36,972*	*20,737*	*20,10,841*	*3,83,68,083*
TOTAL VALUE .	**69,57,699**	**82,146**	**6,82,744**	**2,88,81,147**	**1,49,17,367**	**9,07,804**	**48,84,202**	**13,73,512**	**22,48,057**	**6,09,34,678**

IN SALT.

India between 1st April 1896 and 31st March 1897.

INTO										
NATIVE STATES.				CHIEF SEAPORTS.					GRAND TOTAL.	SALT.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.		
R	R		R	R	R	R	R	R	R	VALUE.
										British Provinces (EXCLUDING CHIEF SEAPORTS).
										From—
...	4,47,720	30,592	4,78,312	1,97,941	...	...	...	1,97,941	***15,24,835***	Madras.
14,21,787	21,60,400	12,35,514	48,17,701	...	3,367	...	...	3,367	***1,25,14,603***	Bombay.
...	...	...	...	...	...	...	...	...	***4,584***	Sind.
...	...	...	...	...	...	...	1,484	1,484	***2,57,925***	Bengal.
2,07,335	...	...	2,07,335	...	...	...	174	174	***2,44,027***	North-West Provinces and Oudh.
328	10	...	338	...	...	208	2,002	2,210	***13,85,166***	Panjab.
35,652	28	...	35,680	...	12	...	...	12	***71,808***	Central Provinces.
...	...	...	...	...	...	...	...	...	***3,164***	Berar.
...	...	...	...	...	...	...	...	...	***2,912***	Assam.
16,65,102	*26,08,158*	*12,66,106*	*55,39,366*	*1,97,941*	*3,379*	*208*	*3,660*	*2,05,188*	***1,60,09,024***	Total.
										Native States.
										From—
...	...	...	...	...	...	...	...	...	***1,22,90,313***	Rajputana and Central India.
...	...	...	...	...	...	...	...	...	***10,238***	Nizam's Territory.
...	...	...	...	...	...	...	...	...	***1,574***	Mysore.
...	...	...	...	...	...	...	...	...	***1,23,02,125***	Total.
										Chief Seaports.
										From—
...	23,507	1,77,193	2,00,700	...	...	...	...	...	***66,79,260***	Madras Ports.
46	2,20,597	39,280	2,59,923	4	...	...	...	4	***3,97,340***	Bombay.
...	...	...	...	...	...	...	...	...	***6,48,122***	Karachi.
...	...	...	...	...	...	...	...	...	***3,11,03,988***	Calcutta.
46	*2,44,104*	*2,16,473*	*4,60,623*	*4*	...	...	...	*4*	***3,88,28,710***	Total.
16,65,148	28,52,262	14,82,579	59,99,989	1,97,945	3,379	208	3,660	2,05,192	***6,71,39,859***	TOTAL VALUE.

Weight of Coal and Coke carried by Rail and River in British

IMPORTED

Coal and Coke.	British Provinces (excluding Chief Seaports).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
Quantity.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
British Provinces (excluding Chief Seaports).										
From—										
Madras	...	5,508	...	58,162	...	295	...	...	...	63,965
Bombay	...	...	...	...	544	...	4,693	7,306	...	12,543
Sind	...	...	...	...	...	3,841	...	...	...	3,841
Bengal	756	4,544	...	...	9,050,163	614,201	753,930	62,744	4,317	10,490,655
North-West Provinces and Oudh.	...	...	588	50	...	1,282,336	191,469	...	...	1,474,443
Panjab	...	7,389	1,034	...	1,876	...	...	...	...	10,299
Central Provinces	...	1,213,619	...	361	629	10	...	563,398	...	1,778,017
Berar	...	4,144	...	...	...	...	37	...	...	4,181
Assam	...	...	...	1,347,454	...	...	...	...	...	1,347,454
Total	*756*	*1,235,204*	*1,622*	*1,406,027*	*9,053,212*	*1,900,683*	*950,129*	*633,448*	*4,317*	*15,185,398*
Native States.										
From—										
Rajputana and Central India.	...	90,610	...	...	1,087,822	5,109	1,264,518	17	...	2,448,076
Nizam's Territory	2,361,565	2,093,105	...	16,118	...	...	175,361	...	...	4,646,149
Mysore	2,042	5	...	...	...	...	...	...	...	2,047
Total	*2,363,607*	*2,183,720*	...	*16,118*	*1,087,822*	*5,109*	*1,439,879*	*17*	...	*7,096,272*
Chief Seaports.										
From—										
Madras Ports	1,184,946	...	...	11,772	...	...	...	...	...	1,196,718
Bombay	15	2,814,851	...	...	13	...	4,861	3,794	...	2,823,534
Karachi	...	...	204,824	...	...	8,078	...	...	...	212,902
Calcutta	...	...	...	1,250,136	120	381	...	...	114,353	1,364,990
Total	*1,184,961*	*2,814,851*	*204,824*	*1,261,908*	*133*	*8,459*	*4,861*	*3,794*	*114,353*	*5,598,144*
Grand Total in Maunds	*3,549,324*	*6,233,775*	*206,446*	*2,684,053*	*10,141,167*	*1,914,251*	*2,394,869*	*637,259*	*118,670*	*27,879,814*
Grand Total in Tons	129,905	228,156	7,556	98,237	371,167	70,062	87,652	23,324	4,342	1,020,401

IN COAL.

India between 1st April 1896 and 31st March 1897.

INTO

Native States.				Chief Seaports.					Grand Total.		Coal and Coke.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.			
Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Tons.	Quantity.
											British Provinces (excluding Chief Seaports).
											From—
...	7	30,402	30,409	242,251	...	...	...	242,251	***336,625***	12,320	Madras.
207,374	12	1	207,387	1	274,185	...	...	274,186	***494,116***	18,085	Bombay.
...	...	...	...	...	...	811	...	811	***4,652***	170	Sind.
351,378	...	...	351,378	...	396	...	38,928,642	38,929,038	***49,771,071***	1,821,621	Bengal.
1,075,898	...	...	1,075,898	...	...	773	...	773	***2,551,114***	93,371	North-West Provinces and Oudh.
177	...	...	177	...	...	...	...	...	***10,476***	383	Panjab.
358,211	...	...	358,211	...	4,542	...	104	4,646	***2,140,874***	78,356	Central Provinces.
...	...	...	...	...	...	...	...	...	***4,181***	153	Berar.
...	...	...	...	...	...	...	538,027	538,027	***1,885,481***	69,009	Assam.
1,993,038	19	30,403	2,023,460	242,252	279,123	1,584	39,466,773	39,989,732	***57,198,590***	2,093,468	Total.
											Native States.
											From—
...	...	...	...	...	...	...	...	...	***2,448,076***	89,600	Rajputana and Central India.
...	...	...	...	104,991	1 182,570	...	...	1,287,561	***5,933,710***	217,174	Nizam's Territory.
...	...	...	...	1	...	...	...	1	***2,048***	75	Mysore.
...	...	...	...	104,992	1,182,570	...	...	1,287,562	***8,383,834***	306,849	Total.
											Chief Seaports.
											From—
...	114	2,871,758	2,871,872	...	2	...	...	2	***4,068,592***	148,911	Madras Ports.
76,634	2,548	...	79,182	...	...	...	...	...	***2,902,716***	106,239	Bombay.
...	...	...	...	...	...	...	...	...	***212,902***	7,792	Karachi.
...	...	...	...	2	41	...	...	43	***1,365,033***	49,960	Calcutta.
76,634	2,662	2,871,758	2,951,054	2	43	...	...	45	***8,549,243***	312,902	Total.
2,069,672	2,681	2,902,161	4,974,514	347,246	1,461,736	1,584	39,466,773	41,277,339	***74,131,667***	...	Grand Total in Maunds.
75,750	98	106,219	182,067	12,710	53,500	58	1,444,483	1,510,751	...	2,713,219	Grand Total in Tons.

Value of Coal and Coke carried by Rail and River in British

IMPORTED

Coal and Coke.	British Provinces (excluding Chief Seaports).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
VALUE.	R	R	R	R			R		R	
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras . . .	...	4,131	...	43,622	...	221	...	...	...	47,974
Bombay . . .	...	...	...	...	408	...	3,520	5,479	...	9,407
Sind	...	...	...	...	...	3,841	...	...	...	3,841
Bengal . . .	472	2,840	...	...	56,56,352	3,83,876	4,71,206	39,215	2,698	65,56,659
North-West Provinces and Oudh.	...	...	441	37	...	9,61,752	1,43,602	...	...	11,05,832
Panjab . . .	...	9,236	1,292	...	2,345	...	...	...	...	12,873
Central Provinces .	...	3,03,405	...	90	157	2	...	1,40,849	...	4,44,503
Berar . . .	...	2,072	...	...	...	...	18	...	...	2,090
Assam . . .	...	...	...	6,73,727	...	...	...	...	...	6,73,727
Total .	472	3,21,684	1,733	7,17,476	56,59,262	13,49,692	6,18,346	1,85,543	2,698	88,56,906
Native States.										
From—										
Rajputana and Central India.	...	67,957	...	...	8,15,866	6,386	3,16,129	8	...	12,06,346
Nizam's Territory .	17,71,174	15,69,829	...	10,074	...	...	43,840	...	...	33,94,917
Mysore . . .	1,532	4	...	...	...	...	...	...	...	1,536
Total .	17,72,706	16,37,790	...	10,074	8,15,866	6,386	3,59,969	8	...	46,02,799
Chief Seaports.										
From—										
Madras Ports . .	8,88,710	...	...	8,829	...	...	...	...	...	8,97,539
Bombay . . .	11	21,11,138	...	...	10	...	3,646	2,845	...	21,17,650
Karachi . . .	...	...	2,04,824	...	...	8,078	...	...	...	2,12,902
Calcutta . . .	...	...	...	7,81,335	74	238	...	...	71,471	8,53,118
Total .	8,88,721	21,11,138	2,04,824	7,90,164	84	8,316	3,646	2,845	71,471	4,081,209
TOTAL VALUE .	26,61,899	40,70,612	2,06,557	15,17,714	64,75,212	13,64,394	9,81,961	1,88,396	74,169	1,75,40,914

IN COAL.

India between 1st April 1896 and 31st March 1897.

INTO

Native States.				Chief Seaports.					Grand Total.	Coal and Coke.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.		
	₹	₹	₹	₹	₹	₹	₹	₹	₹	Value.
										British Provinces (excluding Chief Seaports).
										From—
...	5	22,802	22,807	1,81,688	...	...	...	1,81,688	***2,52,469***	Madras.
1,55,530	9	1	1,55,540	1	2,05,639	...	...	2,05,640	***3,70,587***	Bombay.
...	...	...	...	...	...	811	...	811	***4,652***	Sind.
2,19,611	...	...	2,19,611	...	247	...	2,43,30,401	2,43,30,648	***3,11,06,918***	Bengal.
8,06,923	...	...	8,06,923	...	...	580	...	580	***19,13,335***	North-West Provinces and Oudh.
221	...	...	221	...	...	...	...	...	***13,094***	Panjab.
89,553	...	...	89,553	...	1,135	...	26	1,161	***5,35,217***	Central Provinces.
...	...	...	...	...	...	...	...	...	***2,090***	Berar.
...	...	...	...	...	...	...	2,69,013	2,69,013	***9,42,740***	Assam.
12,71,838	*14*	*22,803*	*12,94,655*	*1,81,689*	*2,07,021*	*1,391*	*2,45,99,440*	*2,49,89,541*	***3,51,41,102***	Total.
										Native States.
										From—
...	...	...	...	...	...	...	...	...	***12,06,346***	Rajputana and Central India.
...	...	...	...	78,743	8,86,927	...	...	9,65,670	***43,60,587***	Nizam's Territory.
...	...	...	...	1	...	...	...	1	***1,537***	Mysore.
...	...	...	...	*78,744*	*8,86,927*	...	...	*9,65,671*	***55,68,470***	Total.
										Chief Seaports.
										From—
...	86	21,53,819	21,53,905	...	2	...	...	2	***30,51,446***	Madras Ports.
57,476	1,911	...	59,387	...	...	...	...	...	***21,77,037***	Bombay.
...	...	...	...	...	...	...	...	...	***2,12,902***	Karachi.
...	...	...	...	1	26	...	...	27	***8,53,145***	Calcutta.
57,476	*1,997*	*21,53,819*	*22,13,292*	*1*	*28*	...	...	*29*	***62,94,530***	Total.
13,29,314	2,011	21,76,622	35,07,947	2,60,434	10,93,976	1,391	2,45,99,440	2,59,55,241	***4,70,04,102***	Total Value.

Weight of Iron and Steel—Cast—carried by Rail and River

IMPORTED

Iron and Steel—Cast.	British Provinces (excluding Chief Seaports).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
Quantity.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
British Provinces (excluding Chief Seaports).										
From—										
Madras	...	26	...	...	...	...	...	...	...	26
Bombay	61	...	...	...	...	1	11	44	...	117
Sind	...	...	...	...	...	1,327	...	...	...	1,327
Bengal	88	...	...	...	3,608	1	534	...	16	4,247
North-West Provinces and Oudh.	...	...	...	1,246	...	1,862	225	...	...	3,333
Panjab	...	...	69	...	8,161	...	123	...	...	8,353
Central Provinces	...	42	...	3,108	14,801	2,042	...	44	...	20,037
Berar	...	...	...	...	...	...	32	...	...	32
Assam	...	...	...	...	...	...	...	...	...	...
Total	*149*	*68*	*69*	*4,354*	*26,570*	*5,233*	*925*	*88*	*16*	*37,472*
Native States.										
From—										
Rajputana and Central India.	...	4	...	...	148	...	235	...	...	387
Nizam's Territory	955	1	...	...	...	...	...	...	...	956
Mysore	144	89	...	...	...	...	...	...	...	233
Total	*1,099*	*94*	...	...	*148*	...	*235*	...	...	*1,576*
Chief Seaports.										
From—										
Madras Ports	57,902	19	...	...	...	...	...	...	...	57,921
Bombay	954	61,863	...	80	1,151	4,872	1,014	1,231	...	71,165
Karachi	...	...	2,029	...	1,636	5,792	...	...	...	9,457
Calcutta	...	...	...	248,363	13,201	5,428	566	26	5,936	273,520
Total	*58,856*	*61,882*	*2,029*	*248,443*	*15,988*	*16,092*	*1,580*	*1,257*	*5,936*	*412,063*
Total in Maunds	*60,104*	*62,044*	*2,098*	*252,797*	*42,706*	*21,325*	*2,740*	*1,345*	*5,952*	*451,111*
Total in Tons	2,200	2,271	77	9,252	1,563	781	100	49	218	16,511

in British India between 1st October 1896 and 31st March 1897.

INTO

Native States.				Chief Seaports.					Grand Total.		Iron and Steel—Cast.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.			
Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Tons.	Quantity.
											British Provinces (excluding Chief Seaports.
											From—
...	187	97	284	6,080	20	...	...	6,100	***6,410***	235	Madras.
18	18	33	69	...	435	...	...	435	***621***	23	Bombay.
...	...	...	...	...	...	89	...	89	***1,416***	52	Sind.
215	...	...	215	...	2	...	30,951	30,953	***35,415***	1,296	Bengal.
117	...	...	117	...	175	...	1,712	1,887	***5,337***	195	North-West Provinces and Oudh.
27	...	...	27	...	...	...	61	61	***8,441***	309	Panjab.
72	...	...	72	...	...	...	269	269	***20,378***	746	Central Provinces.
...	2	...	2	...	25	...	...	25	***59***	2	Berar.
...	...	...	...	...	...	...	48	48	***48***	2	Assam.
449	*207*	*130*	*786*	*6,080*	*657*	*89*	*33,041*	*39,867*	***78,125***	2,860	Total.
											Native States.
											From—
...	...	...	...	...	4	...	2,400	2,404	***2,791***	102	Rajputana and Central India.
...	...	...	...	...	41	...	...	41	***997***	37	Nizam's Territory.
...	...	...	...	40	...	...	...	40	***273***	10	Mysore.
...	...	...	...	*40*	*45*	...	*2,400*	*2,485*	***4,061***	149	Total.
											Chief Seaports.
											From—
10	238	550	798	...	9	...	...	9	***58,728***	2,150	Madras Ports.
398	2,413	389	3,200	27	...	...	...	27	***74,392***	2,723	Bombay.
...	...	...	...	...	...	...	...	...	***9,457***	346	Karachi.
178	...	...	178	...	...	...	...	...	***273,698***	10,017	Calcutta.
586	*2,651*	*939*	*4,176*	*27*	*9*	...	...	*36*	***416,275***	15,236	Total.
1,035	*2,858*	*1,069*	*4,962*	*6,147*	*711*	*89*	*35,441*	*42,388*	***498,461***	...	Total in Maunds.
38	105	39	182	225	26	3	1,298	1,552	...	18,245	Total in Tons.

Value of Iron and Steel—Cast—carried by Rail and River in

IMPORTED

IRON AND STEEL—CAST.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
VALUE.		₹	₹				₹	₹	₹	₹
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras	...	221	...	...	...	...	...	...	...	221
Bombay	335	...	...	...	...	6	61	242	...	644
Sind	...	...	...	...	...	7,298	...	...	...	7,298
Bengal	198	...	...	...	8,118	2	1,201	...	36	9,555
North-West Provinces and Oudh.	...	...	...	7,476	...	11,172	1,350	...	...	19,998
Panjab	...	...	375	...	44,375	...	669	...	...	45,419
Central Provinces	...	289	...	21,367	1,01,757	14,039	...	302	...	1,37,754
Berar	...	...	...	...	...	...	176	...	...	176
Assam	...	...	...	...	...	...	...	...	...	...
Total	*533*	*510*	*375*	*28,843*	*1,54,250*	*32,517*	*3,457*	*544*	*36*	*2,21,065*
Native States.										
From—										
Rajputana and Central India.	...	22	...	...	888	...	1,616	...	...	2,526
Nizam's Territory	8,117	5	...	...	...	...	....	...	...	8,122
Mysore	1,224	490	...	...	...	...	...	...	...	1,714
Total	*9,341*	*517*	...	...	*888*	...	*1,616*	...	...	*12,362*
Chief Seaports.										
From—										
Madras Ports	4,92,167	161	...	...	...	...	...	...	...	4,92,328
Bombay	5,247	3,40,246	...	440	6,330	26,796	5,577	6,771	...	3,91,407
Karachi	...	...	11,159	....	8,998	31,856	...	....	...	52,013
Calcutta	...	...	...	5,58,817	29,702	12,213	1,273	58	13,356	6,15,419
Total	*4,97,414*	*3,40,407*	*11,159*	*5,59,257*	*45,030*	*70,865*	*6,850*	*6,829*	*13,356*	*15,51,167*
TOTAL VALUE	5,07,288	3,41,434	11,534	5,88,100	2,00,168	1,03,382	11,923	7,373	13,392	17,84,594

and STEEL—*CAST.*

British India between 1st October 1896 and 31st March 1897.

INTO

Native States.				Chief Seaports.					Grand Total.	Iron and Steel—Cast.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.		
₹	₹	₹	₹	₹	₹	₹	₹	₹	₹	Value.
										British Provinces (excluding Chief Seaports).
										From—
...	1,589	824	2,413	51,680	170	...	...	51,850	***54,484***	Madras.
99	99	181	379	...	2,392	...	...	2,392	***3,415***	Bombay.
...	...	...	...	...	...	489	...	489	***7,787***	Sind.
484	...	...	484	...	4	...	69,639	69,643	***79,682***	Bengal.
702	...	...	702	...	1,050	...	10,272	11,322	***32,022***	North-West Provinces and Oudh.
147	...	...	147	...	...	...	332	332	***45,898***	Panjab.
495	...	...	495	...	...	...	1,849	1,849	***1,40,098***	Central Provinces.
...	11	...	11	...	137	...	...	137	***324***	Berar.
...	...	...	...	...	...	...	108	108	***108***	Assam.
1,927	*1,699*	*1,005*	*4,631*	*51,680*	*3,753*	*489*	*82,200*	*1,38,122*	***3,63,818***	Total.
										Native States.
										From—
...	...	...	...	...	22	...	5,400	5,422	***7,948***	Rajputana and Central India.
...	...	...	...	...	226	...	...	226	***8,348***	Nizam's Territory.
...	...	...	...	340	...	...	...	340	***2,054***	Mysore.
...	...	...	...	*340*	*248*	...	*5,400*	*5,988*	***18,350***	Total.
										Chief Seaports.
										From—
85	2,023	4,675	6,783	...	76	...	...	76	***4,99,187***	Madras Ports.
2,189	13,271	2,140	17,600	149	...	...	...	149	***4,09,156***	Bombay.
...	...	...	...	...	...	...	...	...	***52,013***	Karachi.
400	...	...	400	...	...	...	...	...	***6,15,819***	Calcutta.
2,674	*15,294*	*6,815*	*24,783*	*149*	*76*	...	...	*225*	***15,76,175***	Total.
4,601	**16,993**	**7,820**	**29,414**	**52,169**	**4,077**	**489**	**87,600**	**1,44,335**	***19,58,343***	Total Value.

Weight of Iron and Steel—Unwrought—carried by Rail and River in

IMPORTED

Iron and Steel—Unwrought.	British Provinces (excluding Chief Seaports).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
Quantity.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
British Provinces (excluding Chief Seaports).										
From—										
Madras	...	4	...	800	...	...	...	...	...	804
Bombay	285	...	...	...	...	...	...	...	...	285
Sind	...	...	...	...	464	12	...	...	...	476
Bengal	17	...	...	...	...	27	...	...	7	51
North-West Provinces and Oudh.	1	...	...	4	...	652	1	...	...	658
Panjab	...	...	65	...	563	...	...	...	...	628
Central Provinces	51	8	...	10	2	871	...	10	...	952
Berar	...	4	...	...	...	...	...	...	...	4
Assam	...	...	...	1	...	...	...	...	...	1
Total	*354*	*16*	*65*	*815*	*1,029*	*1,562*	*1*	*10*	*7*	*3,859*
Native States.										
From—										
Rajputana and Central India.	...	...	...	...	...	...	7	...	...	7
Nizam's Territory	11	...	...	...	...	...	...	...	...	11
Mysore	7	...	...	...	...	...	...	...	...	7
Total	18	...	...	...	...	...	7	...	...	25
Chief Seaports.										
From—										
Madras Ports	25,831	25	...	5	...	...	...	...	...	25,861
Bombay	1,330	2,950	...	...	301	289	14	30	...	4,914
Karachi	...	...	29	...	...	375	...	...	...	404
Calcutta	...	...	...	15,488	12,135	24	...	...	551	28,198
Total	*27,161*	*2,975*	*29*	*15,493*	*12,436*	*688*	*14*	*30*	*551*	*59,377*
Total in Maunds	*27,533*	*2,991*	*94*	*16,308*	*13,465*	*2,250*	*22*	*40*	*558*	*63,261*
Total in Tons	1,008	110	3	597	493	82	1	1	20	2,315

* Values in ton being less than one are not shown in the column. The return for Berar is 8 cwt. 3 qrs. 3 lbs., that for Nizám's Territory is 11 cwt.

STEEL—*UNWROUGHT.*

British India between 1st October 1896 and 31st March 1897.

INTO

Native States.				Chief Seaports.					Grand Total.		Iron and Steel—Unwrought.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.			
Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Tons.	Quantity.
											British Provinces (excluding Chief Seaports).
											From—
...	150	478	628	5,541	...	...	...	5,541	***6,973***	255	Madras.
40	...	45	85	545	20	...	...	565	***935***	34	Bombay.
...	...	...	...	...	...	...	...	...	***476***	18	Sind.
...	...	...	...	1	...	...	90,387	90,388	***90,439***	3,310	Bengal.
66	...	...	66	...	...	...	399	399	***1,123***	41	North-West Provinces and Oudh.
65	...	...	65	...	...	...	...	...	***693***	25	Panjab.
3	14	...	17	...	...	...	34	34	***1,003***	37	Central Provinces.
...	...	...	...	...	8	...	...	8	***12***	*	Berar.
...	...	...	...	...	...	...	52	52	***53***	2	Assam.
174	*164*	*523*	*861*	*6,087*	*28*	...	*90,872*	*96,987*	***1,01,707***	3,722	Total.
											Native States.
											From—
...	...	..	...	19	...	...	...	19	***26***	1	Rajputana and Central India.
...	...	...	...	4	...	...	...	4	***15***	*	Nizam's Territory.
...	...	...	...	...	...	...	...	...	***7***	*	Mysore.
...	...	...	...	*23*	...	...	...	*23*	***48***	1	Total.
											Chief Seaports.
											From—
...	...	60,659	60,659	...	...	...	...	...	***86,520***	3,166	Madras Ports.
9	14	1,199	1,222	1,095	...	...	...	1,095	***7,231***	265	Bombay.
...	...	...	...	...	...	...	...	...	***404***	15	Karachi.
...	...	...	...	...	...	...	...	...	***28,198***	1,032	Calcutta.
9	*14*	*61,858*	*61,881*	*1,095*	...	...	...	*1,095*	***1,22,353***	4,478	Total.
183	*178*	*62,381*	*62,742*	*7,205*	*28*	...	*90,872*	*98,105*	***2,24,108***	...	Total in Maunds.
7	6	2,283	2,296	264	1	...	3,326	3,591	...	8,202	Total in Tons.

2 qrs. 9 lbs., and that for Mysore is 5 cwt. 13 lbs. Hence a little difference of 1 ton will be noticed in the total for Nizam's Territory, page 103.

Value of Iron and Steel—Unwrought—carried by Rail and River in

IMPORTED

Iron and Steel—Unwrought.	British Provinces (excluding Chief Seaports).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
Value.	₹	₹	₹	₹	₹	₹	₹	₹	₹	₹
British Provinces (excluding Chief Seaports).										
From—										
Madras	...	9	...	1,900	...	...	...	...	...	1,909
Bombay	1,140	...	...	...	...	...	...	...	...	1,140
Sind	...	...	...	...	1,856	48	...	...	...	1,904
Bengal	106	...	...	...	...	169	...	...	44	319
North-West Provinces and Oudh.	4	...	...	16	...	2,608	4	...	...	2,632
Panjab	...	...	146	...	1,267	...	...	...	...	1,413
Central Provinces	344	54	...	67	13	5,879	...	67	...	6,424
Berar	...	16	...	...	...	...	...	...	...	16
Assam	...	...	...	6	...	...	...	...	...	6
Total	*1,594*	*79*	*146*	*1,989*	*3,136*	*8,704*	*4*	*67*	*44*	*15,763*
Native States.										
From—										
Rajputana and Central India.	...	...	...	...	...	...	47	...	...	47
Nizam's Territory	26	...	...	...	...	...	...	...	...	26
Mysore	17	...	...	...	...	...	...	...	...	17
Total	*43*	...	...	...	...	...	*47*	...	...	*90*
Chief Seaports.										
From—										
Madras Ports	61,349	59	...	12	...	...	...	...	...	61,420
Bombay	5,320	11,800	...	...	1,204	1,156	56	120	...	19,656
Karachi	...	...	116	...	...	1,500	...	...	...	1,616
Calcutta	...	...	...	96,800	75,844	150	...	...	3,444	1,76,238
Total	*66,669*	*11,859*	*116*	*96,812*	*77,048*	*2,806*	*56*	*120*	*3,444*	*2,58,930*
Total Value	68,306	11,938	262	98,801	80,184	11,510	107	187	3,488	2,74,783

STEEL—*UNWROUGHT.*

British India between 1st October 1896 and 31st March 1897.

INTO

Native States.				Chief Seaports.					Grand Total.	Iron and Steel—Unwrought.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.		
₹	₹	₹	₹	₹	₹	₹	₹	₹	₹	Value.
										British Provinces (excluding Chief Seaports).
										From—
...	356	1,135	1,491	13,160	...	...	...	13,160	**16,560**	Madras.
160	...	180	340	2,180	80	...	...	2,260	**3,740**	Bombay.
...	...	...	...	...	...	...	...	...	**1,904**	Sind.
...	...	...	...	6	...	...	5,64,918	5,64,924	**5,65,243**	Bengal.
264	...	...	264	...	...	...	1,596	1,596	**4,492**	North-West Provinces and Oudh.
146	...	...	146	...	...	...	...	...	**1,559**	Panjab.
20	94	...	114	...	...	...	229	229	**6,767**	Central Provinces.
...	...	...	...	...	32	...	...	32	**48**	Berar.
...	...	...	...	...	...	...	325	325	**331**	Assam.
590	450	1,315	2,355	15,346	112	...	5,67,068	5,82,526	**6,00,644**	Total.
										Native States.
										From—
...	...	...	...	45	...	...	...	45	**92**	Rajputana and Central India.
...	...	...	...	9	...	...	...	9	**35**	Nizam's Territory.
...	...	...	...	...	...	...	...	...	**17**	Mysore.
...	...	...	...	54	...	...	...	54	**144**	Total.
										Chief Seaports.
										From—
...	...	1,44,065	1,44,065	...	...	...	...	...	**2,05,485**	Madras Ports.
36	56	4,796	4,888	4,380	...	...	...	4,380	**28,924**	Bombay.
...	...	...	...	...	...	...	...	...	**1,616**	Karachi.
...	...	...	...	...	...	...	...	...	**1,76,238**	Calcutta.
36	56	1,48,861	1,48,953	4,380	...	...	...	4,380	**4,12,263**	Total.
626	506	1,50,176	1,51,308	19,780	112	...	5,67,068	5,86,960	**10,13,051**	Total Value.

Weight of Iron and Steel—Wrought—carried by Rail and River in

IMPORTED

IRON AND STEEL—WROUGHT.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
QUANTITY.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras . . .	...	130	...	632	...	...	...	...	...	762
Bombay . . .	549	...	...	...	1,296	10	426	1,161	...	3,442
Sind	...	...	...	...	5	13,542	...	...	...	13,547
Bengal . . .	95	...	...	...	7,567	4,659	1,075	...	2,492	15,888
North-West Provinces and Oudh.	23	...	100	22,303	...	8,633	2,503	19	...	33,581
Panjab . . .	...	...	2,034	16	10,807	...	41	29	...	12,927
Central Provinces .	2	101	...	486	6,876	7,175	...	849	...	15,489
Berar . . .	...	38	...	...	...	...	501	...	...	539
Assam . . .	...	...	...	79	...	...	...	...	...	79
Total .	*669*	*269*	*2,134*	*23,516*	*26,551*	*34,019*	*4,546*	*2,058*	*2,492*	*96,254*
Native States.										
From—										
Rajputana and Central India.	...	828	15	413	5,862	4,830	680	9	...	12,637
Nizam's Territory .	12	11	...	...	...	...	8	164	...	195
Mysore . . .	1,903	199	...	...	...	...	...	...	...	2,102
Total .	*1,915*	*1,038*	*15*	*413*	*5,862*	*4,830*	*688*	*173*	...	*14,934*
Chief Seaports.										
From—										
Madras Ports . .	118,195	562	...	3	51	9	11	86	...	118,917
Bombay . . .	1,963	307,404	...	40	45,055	45,587	39,569	47,648	...	487,266
Karachi . . .	...	...	14,833	...	10,372	163,341	...	...	...	188,546
Calcutta . . .	...	513	220	483,924	215,703	34,276	8,402	...	102,128	845,166
Total .	*120,158*	*308,479*	*15,053*	*483,967*	*271,181*	*243,213*	*47,982*	*47,734*	*102,128*	*1,639,895*
TOTAL IN MAUNDS .	*122,742*	*309,786*	*17,202*	*507,896*	*303,594*	*282,062*	*53,216*	*49,965*	*104,620*	*1,751,083*
TOTAL IN TONS .	4,472	11,338	630	18,589	11,112	10,323	1,948	1,829	3,829	64,090

and STEEL—*WROUGHT.*

British India between 1st October 1896 and 31st March 1897.

INTO

Native States.				Chief Seaports.					Grand Total.		Iron and Steel—Wrought.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.			
Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Tons.	Quantity.
											British Provinces (excluding Chief Seaports).
											From—
...	851	132	983	3,336	15	...	...	3,351	***5,096***	187	Madras.
1,921	1,227	4,032	7,180	...	2,368	...	...	2,368	***12,990***	475	Bombay.
...	...	...	...	...	...	689	...	689	***14,236***	521	Sind.
11	...	...	11	23	8	...	8,357	8,388	***24,287***	889	Bengal.
7,050	...	1	7,051	...	287	50	1,426	1,763	***42,395***	1,552	North-West Provinces and Oudh.
2,715	...	...	2,715	...	115	376	33	524	***16,166***	592	Panjab.
459	...	...	459	...	82	...	4,234	4,316	***20,264***	741	Central Provinces.
6	...	...	6	...	52	...	...	52	***597***	22	Berar.
...	...	...	...	...	...	...	133	133	***212***	7	Assam.
12,162	*2,078*	*4,165*	*18,405*	*3,359*	*2,927*	*1,115*	*14,183*	*21,584*	***136,243***	4,986	Total.
											Native States.
											From—
...	...	...	...	...	4	...	29	33	***12,670***	464	Rajputana and Central India.
...	...	...	...	9	317	...	...	326	***521***	19	Nizam's Territory.
...	...	...	...	1,126	2	...	...	1,128	***3,230***	118	Mysore.
...	...	...	...	*1,135*	*323*	...	*29*	*1,487*	***16,421***	601	Total
											Chief Seaports.
											From—
21	667	29,729	30,417	...	13	...	...	13	***149,347***	5,467	Madras Ports.
98,118	25,990	4,800	128,908	83	...	...	124	207	***616,381***	22,560	Bombay.
119	...	...	119	...	...	...	...	...	***188,665***	6,905	Karachi.
2,425	...	1	2,426	5	8	...	...	13	***847,605***	31,022	Calcutta.
100,683	*26,657*	*34,530*	*161,870*	*88*	*21*	...	*124*	*233*	***1,801,998***	65,954	Total.
112,845	*28,735*	*38,695*	*180,275*	*4,582*	*3,271*	*1,115*	*14,336*	*23,304*	***1,954,662***	...	Total in Maunds.
4,130	1,052	1,416	6,598	168	120	41	524	853	...	71,541	Total in Tons.

Value of Iron and Steel—Wrought—*carried by Rail and River*

IMPORTED

IRON AND STEEL—WROUGHT.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
	₹	₹	₹	₹	₹	₹	₹	₹	₹	₹
VALUE.										
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras	...	593	...	2,883	...	...	...	...	...	3,476
Bombay	4,529	...	...	...	10,692	83	3,515	9,578	...	28,397
Sind	...	...	...	...	41	1,11,721	...	...	...	1,11,762
Bengal	511	...	...	...	40,673	25,042	5,778	...	13,394	85,398
North-West Provinces and Oudh.	115	...	500	1,11,515	...	43,165	12,515	95	...	1,67,905
Panjab	...	...	13,602	107	72,272	...	274	194	...	86,449
Central Provinces	12	593	...	2,855	40,396	42,153	...	4,988	...	90,997
Berar	...	494	...	...	...	...	6,513	...	...	7,007
Assam	...	...	...	425	...	...	...	...	...	425
Total	*5,167*	*1,680*	*14,102*	*1,17,785*	*1,64,074*	*2,22,164*	*28,595*	*14,855*	*13,394*	*5,81,816*
Native States.										
From—										
Rajputana and Central India.	...	6,831	124	2,220	29,310	32,301	3,995	117	...	74,898
Nizam's Territory	55	91	...	...	...	...	47	2,132	...	2,325
Mysore	8,682	1,642	...	...	...	...	...	...	...	10,324
Total	*8,737*	*8,564*	*124*	*2,220*	*29,310*	*32,301*	*4,042*	*2,249*	...	*87,547*
Chief Seaports.										
From—										
Madras Ports	5,39,265	2,564	...	14	233	41	50	392	...	5,42,559
Bombay	16,195	25,36,083	...	330	3,71,703	3,76,093	3,26,444	3,93,096	...	40,19,944
Karachi	...	...	1,22,372	...	85,569	13,47,563	...	...	...	15,55,504
Calcutta	...	2,757	1,182	26,01,092	11,59,404	1,84,233	45,161	...	5,48,938	45,42,767
Total	*5,55,460*	*25,41,404*	*1,23,554*	*26,01,436*	*16,16,909*	*19,07,930*	*3,71,655*	*3,93,488*	*5,48,938*	*1,06,60,774*
TOTAL VALUE	5,69,364	25,51,648	1,37,780	27,21,441	18,10,293	21,62,395	4,04,292	4,10,592	5,62,332	1,13,30,137

and STEEL—*WROUGHT.*

in British India between 1st October 1896 and 31st March 1897:

INTO										
Native States.				Chief Seaports.					Grand Total.	Iron and Steel—Wrought.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.		
₹	₹	₹	₹	₹	₹	₹	₹	₹	₹	
										Value.
										British Provinces (excluding Chief Seaports).
										From—
...	3,883	602	4,485	15,220	68	...	...	15,288	***23,249***	Madras.
15,848	10,123	33,264	59,235	...	19,537	...	...	19,537	***1,07,169***	Bombay.
...	...	...	...	...	...	5,684	...	5,684	***1,17,446***	Sind.
59	...	...	59	124	43	...	44,919	45,086	***1,30,543***	Bengal.
35,250	...	5	35,255	...	1,435	250	7,130	8,815	***2,11,975***	North-West Provinces and Oudh.
18,157	...	...	18,157	...	769	2,514	221	3,504	***1,08,110***	Panjab.
2,697	...	...	2,697	...	482	...	24,875	25,357	***1,19,051***	Central Provinces.
78	...	...	78	...	676	...	...	676	***7,761***	Berar.
...	...	...	...	...	...	...	715	715	***1,140***	Assam.
72,089	*14,006*	*33,871*	*1,19,966*	*15,344*	*23,010*	*8,448*	*77,860*	*1,24,662*	***8,26,444***	Total.
										Native States.
										From—
...	...	...	...	...	33	...	156	189	***75,087***	Rajputana and Central India.
...	...	...	...	41	2,615	...	...	2,656	***4,981***	Nizam's Territory.
...	...	...	...	5,137	16	...	...	5,153	***15,477***	Mysore.
...	...	...	...	*5,178*	*2,664*	...	*156*	*7,998*	***95,545***	Total.
										Chief Seaports.
										From—
96	3,043	1,35,639	1,38,778	...	59	...	...	59	***6,81,396***	Madras Ports.
8,09,474	2,14,417	39,600	10,63,491	685	...	...	1,023	1,708	***50,85,143***	Bombay.
982	...	...	982	...	...	...	...	...	***15,56,486***	Karachi.
13,034	...	5	13,039	27	43	...	...	70	***45,55,876***	Calcutta.
8,23,586	*2,17,460*	*1,75,244*	*12,16,290*	*712*	*102*	...	*1,023*	*1,837*	***1,18,78,901***	Total.
8,95,675	2,31,466	2,09,115	13,36,256	21,234	25,776	8,448	79,039	1,34,497	***1,28,00,890***	Total Value.

Weight of Iron and Steel—Manufactured—carried by Rail and River

IMPORTED

IRON AND STEEL—MANUFACTURED.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
QUANTITY.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds	Mds.	Mds.	Mds.	Mds.
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras	...	655	...	...	...	5	...	...	...	660
Bombay	2,028	...	...	...	332	76	593	4,011	...	7,040
Sind	...	...	...	...	...	811	...	...	...	811
Bengal	175	...	1	...	2,314	4,686	462	...	1,012	8,650
North-West Provinces and Oudh.	3	21	50	2,033	...	11,148	988	1	...	14,244
Panjab	...	152	1,074	204	23,376	...	77	3	...	24,886
Central Provinces	...	882	78	377	2,038	11,977	...	1,824	...	17,176
Berar	...	55	...	...	10	10	160	...	...	235
Assam	...	...	...	46	...	...	...	...	...	46
Total	*2,206*	*1,765*	*1,203*	*2,660*	*28,070*	*28,713*	*2,280*	*5,839*	*1,012*	*73,748*
Native States.										
From—										
Rajputana and Central India.	...	819	20	906	1,758	954	667	56	...	5,180
Nizam's Territory	1,382	21	...	...	...	...	1	588	...	1,992
Mysore	1,402	63	...	...	4	...	...	...	...	1,469
Total	*2,784*	*903*	*20*	*906*	*1,762*	*954*	*668*	*644*	...	*8,641*
Chief Seaports.										
From—										
Madras Ports	52,745	493	...	2	...	46	2	500	...	53,788
Bombay	4,318	149,893	4	497	28,539	10,383	27,521	16,931	...	238,086
Karachi	...	...	16,510	...	7,525	36,679	...	...	...	60,714
Calcutta	30	461	3	216,391	27,849	8,469	6,334	80	31,131	290,748
Total	*57,093*	*150,847*	*16,517*	*216,890*	*63,913*	*55,577*	*33,857*	*17,511*	*31,131*	*643,336*
TOTAL IN MAUNDS	*62,083*	*153,515*	*17,740*	*220,456*	*93,745*	*85,244*	*36,805*	*23,994*	*32,143*	*725,725*
TOTAL IN TONS	2,272	5,619	649	8,069	3,431	3,120	1,347	878	1,176	26,561

STEEL—*MANUFACTURED.*

in British India between 1st October 1896 and 31st March 1897.

INTO

Native States.				Chief Seaports.					Grand Total.		Iron and Steel—Manufactured.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.			
Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Tons.	Quantity.
											British Provinces (excluding Chief Seaports).
											From—
...	1,007	690	1,697	4,968	964	...	...	5,932	***8,289***	303	Madras.
718	1,551	535	2,804	45	5,731	...	...	5,776	***15,620***	572	Bombay.
...	...	...	...	...	...	1,229	...	1,229	***2,040***	74	Sind.
17	...	...	17	...	2	...	21,543	21,545	***30,212***	1,106	Bengal.
2,271	3	4	2,278	91	297	52	1,080	1,520	***18,042***	660	North-West Provinces and Oudh.
933	...	...	933	9	249	232	85	575	***26,394***	966	Panjab.
924	...	...	924	1	895	...	2,990	3,886	***21,986***	805	Central Provinces.
41	...	...	41	...	586	...	...	586	***862***	32	Berar.
...	...	...	...	...	...	...	493	493	***539***	20	Assam.
4,904	*2,561*	*1,229*	*8,694*	*5,114*	*8,724*	*1,513*	*26,191*	*41,542*	***123,984***	4,538	Total.
											Native States.
											From—
...	...	...	...	10	276	2	4,802	5,090	***10,270***	376	Rajputana and Central India.
...	...	...	...	283	81	...	...	364	***2,356***	86	Nizam's Territory.
...	...	...	...	5,037	2	...	...	5,039	***6,508***	238	Mysore.
...	...	...	...	*5,330*	*359*	*2*	*4,802*	*10,493*	***19,134***	700	Total.
											Chief Seaports.
											From—
7	1,515	31,351	32,873	...	177	1	...	178	***86,839***	3,178	Madras Ports.
13,918	14,369	604	28,891	920	...	...	192	1,112	***268,089***	9,812	Bombay.
1	...	...	1	...	...	...	1	1	***60,716***	2,222	Karachi.
1,626	188	3	1,817	8	54	...	...	62	***292,627***	10,710	Calcutta.
15,552	*16,072*	*31,958*	*63,582*	*928*	*231*	*1*	*193*	*1,353*	***708,271***	25,922	Total.
20,456	*18,633*	*33,187*	*72,276*	*11,372*	*9,314*	*1,516*	*31,186*	*53,388*	***851,389***	...	Total in Maunds.
749	682	1,214	2,645	416	341	56	1,141	1,954	...	31,160	Total in Tons.

Value of Iron and Steel—Manufactured—carried by Rail and River

IMPORTED

Iron and Steel—Manufactured.	British Provinces (excluding Chief Seaports).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
Value.	₹	₹	₹	₹	₹	₹	₹	₹	₹	₹
British Provinces (excluding Chief Seaports).										
From—										
Madras . . .	...	5,363	...	...	...	41	...	...	...	5,404
Bombay . . .	50,700	...	...	...	8,300	1,900	14,825	1,00,275	...	1,76,000
Sind	...	...	...	...	...	20,275	...	...	...	20,275
Bengal . . .	1,050	...	6	...	13,884	28,116	2,772	...	6,072	51,900
North-West Provinces and Oudh.	24	168	400	16,264	...	89,184	7,904	8	...	1,13,952
Panjab . . .	...	1,216	8,592	1,632	1,87,008	...	616	24	...	1,99,088
Central Provinces .	...	13,230	1,170	5,655	30,570	1,79,655	...	27,360	...	2,57,640
Berar . . .	...	935	...	...	170	170	2,720	...	...	3,995
Assam . . .	...	...	...	276	...	...	...	...	...	276
Total .	*51,774*	*20,912*	*10,168*	*23,827*	*2,39,932*	*3,19,341*	*28,837*	*1,27,667*	*6,072*	*8,28,530*
Native States.										
From—										
Rajputana and Central India.	...	20,475	500	5,436	14,064	7,632	10,005	952	...	59,064
Nizam's Territory .	11,315	525	...	...	...	...	15	9,996	...	21,851
Mysore . . .	11,479	1,575	...	...	32	...	...	...	...	13,086
Total .	*22,794*	*22,575*	*500*	*5,436*	*14,096*	*7,632*	*10,020*	*10,948*	...	*94,001*
Chief Seaports.										
From—										
Madras Ports . .	4,31,850	4,036	...	16	...	377	16	4,094	...	4,40,389
Bombay . . .	1,07,950	37,47,325	100	12,425	7,13,475	2,59,575	6,88,025	4,23,275	...	59,52,150
Karachi . . .	...	...	4,12,750	...	1,88,125	9,16,975	...	...	...	15,17,850
Calcutta . . .	180	2,766	18	12,98,346	1,67,094	50,814	38,004	480	1,86,786	17,44,488
Total .	*5,39,980*	*37,54,127*	*4,12,868*	*13,10,787*	*10,68,694*	*12,27,741*	*7,26,045*	*4,27,849*	*1,86,786*	*96,54,877*
Total Value .	6,14,548	37,97,614	4,23,536	13,40,050	13,22,722	15,54,714	7,64,902	5,66,464	1,92,858	1,05,77,408

STEEL—*MANUFACTURED.*

in British India between 1st October 1896 and 31st March 1897.

INTO

Native States.				Chief Seaports.					Grand Total.	Iron and Steel—Manufactured.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.		
₹	₹	₹	₹	₹	₹	₹	₹	₹	₹	Value.
										British Provinces (excluding Chief Seaports).
										From—
...	8,245	5,649	13,894	40,675	7,893	...	...	48,568	**67,866**	Madras.
17,950	38,775	13,375	70,100	1,125	1,43,275	...	...	1,44,400	**3,90,500**	Bombay.
...	...	...	...	...	...	30,725	...	30,725	**51,000**	Sind.
102	...	...	102	...	12	...	1,29,258	1,29,270	**1,81,272**	Bengal.
18,168	24	32	18,224	728	2,376	416	8,640	12,160	**1,44,336**	North-West Provinces and Oudh.
7,464	...	...	7,464	72	1,992	1,856	680	4,600	**2,11,152**	Panjab.
13,860	...	...	13,860	15	13,425	...	44,850	58,290	**3,29,790**	Central Provinces.
697	...	...	697	...	9,962	...	...	9,962	**14,654**	Berar.
...	...	...	...	...	...	...	2,958	2,958	**3,234**	Assam.
58,241	*47,044*	*19,056*	*1,24,341*	*42,615*	*1,78,935*	*32,997*	*1,86,386*	*4,40,933*	**13,93,804**	Total.
										Native States.
										From—
...	...	...	...	82	6,900	50	28,812	35,844	**94,908**	Rajputana and Central India.
...	...	...	...	2,317	2,025	...	...	4,342	**26,193**	Nizam's Territory.
...	...	...	...	41,240	50	...	...	41,290	**54,376**	Mysore.
...	...	...	...	*43,639*	*8,975*	*50*	*28,812*	*81,476*	**1,75,477**	Total.
										Chief Seaports.
										From—
57	12,404	2,56,686	2,69,147	...	1,449	8	...	1,457	**7,10,993**	Madras Ports.
3,47,950	3,59,225	15,100	7,22,275	23,000	...	...	4,800	27,800	**67,02,225**	Bombay.
25	...	...	25	...	...	...	25	25	**15,17,900**	Karachi.
9,756	1,128	18	10,902	48	324	...	...	372	**17,55,762**	Calcutta.
3,57,788	*3,72,757*	*2,71,804*	*10,02,349*	*23,048*	*1,773*	*8*	*4,825*	*29,654*	**1,06,86,880**	Total.
4,16,029	4,19,801	2,90,860	11,26,690	1,09,302	1,89,683	33,055	2,20,023	5,52,063	**1,22,56,161**	Total Value.

Weight of Iron and Steel carried by Rail and River in British

IMPORTED

TOTAL IRON AND STEEL.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
QUANTITY.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras . . .	...	815	...	1,432	...	5	...	...	...	2,252
Bombay . .	2,923	...	...	...	1,628	87	1,030	5,216	...	10,884
Sind	...	...	...	...	469	15,692	...	...	...	16,161
Bengal . . .	375	...	1	...	13,489	9,373	2,071	...	3,527	28,836
North-West Provinces and Oudh.	27	21	150	25,586	...	22,295	3,717	20	...	51,816
Central Provinces .	53	1,033	78	3,981	23,717	22,065	...	2,727	...	53,654
Panjab . . .	...	152	3,242	220	42,907	...	241	32	...	46,794
Berar . . .	...	97	...	...	10	10	693	...	...	810
Assam . . .	...	...	...	126	...	...	...	...	...	126
Total * .	*3,378*	*2,118*	*3,471*	*31,345*	*82,220*	*69,527*	*7,752*	*7,995*	*3,527*	*211,333*
Native States.										
From—										
Rajputana and Central India.	...	1,651	35	1,319	7,768	5,784	1,589	65	...	18,211
Nizam's Territory .	2,360	33	...	...	...	...	9	752	...	3,154
Mysore . . .	3,456	351	...	...	4	...	...	...	...	3,811
Total * .	*5,816*	*2,035*	*35*	*1,319*	*7,772*	*5,784*	*1,598*	*817*	...	*25,176*
Chief Seaports.										
From—										
Madras Ports . .	254,673	1,099	...	10	51	55	13	586	...	256,487
Bombay . . .	8,565	522,110	4	617	75,046	61,131	68,118	65,840	...	801,431
Karachi . . .	...	...	33,401	...	19,533	206,187	...	...	...	259,121
Calcutta . . .	30	974	223	964,166	268,888	48,197	15,302	106	139,746	1,437,632
Total * .	*263,268*	*524,183*	*33,628*	*964,793*	*363,518*	*315,570*	*83,433*	*66,532*	*139,746*	*2,754,671*
GRAND TOTAL * .	*272,462*	*528,336*	*37,134*	*997,457*	*453,510*	*390,881*	*92,783*	*75,344*	*143,273*	*2,991,180*
TOTAL IRON AND STEEL†	*317,241*	*475,956*	*43,018*	*986,980*	*454,288*	*549,939*	*86,218*	*45,553*	*87,212*	*3,046,405*
GRAND TOTAL OF IRON AND STEEL IN MAUNDS.	*589,703*	*1,004,292*	*80,152*	*1,984,437*	*907,798*	*940,820*	*179,201*	*120,897*	*230,485*	*6,037,585*
ND TOTAL OF IRON STEEL IN TONS.	21,583	36,757	2,934	72,630	33,225	34,434	6,552	4,425	8,436	220,976

* From 1st October 1896
† From 1st April to 30th

and STEEL—*TOTAL.*

India between 1st April 1896 and 31st March 1897.

INTO

Native States.				Chief Seaports.					Grand Total.		Total Iron and Steel.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.			
Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Tons.	Quantity.
											British Provinces (excluding Chief Seaports).
											From—
...	2,195	1,397	3,592	19,925	999	...	...	20,924	***26,768***	980	Madras.
2,697	2,796	4,645	10,138	590	8,554	...	...	9,144	***30,166***	1,104	Bombay.
...	...	...	...	...	...	2,007	...	2,007	***18,168***	665	Sind.
243	...	...	243	24	12	...	151,238	151,274	***180,353***	6,601	Bengal.
9,504	3	5	9,512	91	759	102	4,617	5,569	***66,897***	2,448	North-West Provinces and Oudh.
1,458	14	...	1,472	1	977	...	7,527	8,505	***63,631***	2,329	Central Provinces.
3,740	...	...	3,740	9	364	608	179	1,160	***51,694***	1,892	Panjab.
47	2	...	49	...	671	...	...	671	***1,530***	56	Berar.
...	...	...	...	...	...	...	726	726	***852***	31	Assam.
17,689	*5,010*	*6,047*	*28,746*	*20,640*	*12,336*	*2,717*	*164,287*	*199,980*	***440,059***	16,106	Total.*
											Native States.
											From—
...	...	...	...	29	28	2	7,231	7,546	***25,757***	943	Rajputana and Central India.
...	...	...	...	296	439	...	...	735	***3,889***	143	Nizam's Territory.
...	...	...	...	6,203	4	...	...	6,207	***10,018***	366	Mysore.
...	...	...	...	*6,528*	*727*	*2*	*7,231*	*14,488*	***39,664***	1,452	Total.*
											Chief Seaports.
											From—
38	2,420	122,289	124,747	...	199	1	...	200	***381,434***	13,961	Madras Ports.
112,443	42,786	6,992	162,221	2,125	...	...	316	2,441	***966,093***	35,360	Bombay.
120	...	...	120	...	...	...	1	1	***259,242***	9,488	Karachi.
4,229	188	4	4,421	13	62	...	...	75	***1,442,128***	52,781	Calcutta.
116,830	*45,394*	*129,285*	*291,509*	*2,138*	*261*	*1*	*317*	*2,717*	***3,048,897***	111,590	Total.*
134,519	*50,404*	*135,332*	*320,255*	*29,306*	*13,324*	*2,720*	*171,835*	*217,185*	***3,528,620***	129,148	Grand Total.*
154,223	*79,656*	*141,019*	*374,898*	*25,368*	*10,696*	*3,190*	*139,383*	*178,637*	***3,599,940***	131,758	Total Iron and Steel.†
288,742	*130,060*	*276,351*	*695,153*	*54,674*	*24,020*	*5,910*	*311,218*	*395,822*	***7,128,560***	...	Grand Total of Iron and Steel in Maunds.
10,568	4,760	10,115	25,443	2,001	879	216	11,391	14,487	...	260,906	Grand Total of Iron and Steel in Tons.

to 31st March 1897.

September 1896. No details available.

Value of Iron and Steel carried by Rail and River in British

IMPORTED

TOTAL IRON AND STEEL.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
VALUE.	₹	₹	₹	₹	₹	₹	₹	₹	₹	₹
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras	...	6,186	...	4,783	...	41	...	...	...	11,010
Bombay	56,704	...	...	...	18,992	1,989	18,401	1,10,095	...	2,06,181
Sind	...	...	...	...	1,897	1,39,342	...	...	...	1,41,239
Bengal	1,865	...	6	...	62,675	53,329	9,751	...	19,546	1,47,172
North-West Provinces and Oudh.	143	168	900	1,35,271	...	1,46,129	21,773	103	...	3,04,487
Panjab	...	1,216	22,715	1,739	3,04,922	...	1,559	218	...	3,32,369
Central Provinces	356	14,166	1,170	29,944	1,72,736	2,41,726	...	32,717	...	4,92,815
Berar	...	1,445	...	...	170	170	9,409	...	...	11,194
Assam	...	...	...	707	...	...	...	...	...	707
Total*	*59,068*	*23,181*	*24,791*	*1,72,444*	*5,61,392*	*5,82,726*	*60,893*	*1,43,133*	*19,546*	*16,47,174*
Native States.										
From—										
Rajputana and Central India.	...	27,328	624	7,656	44,262	39,933	15,663	1,069	...	1,36,535
Nizam's Territory	19,513	621	...	...	...	...	62	12,128	...	32,324
Mysore	21,402	3,707	...	...	32	...	...	...	...	25,141
Total*	*40,915*	*31,656*	*624*	*7,656*	*44,294*	*39,933*	*15,725*	*13,197*	...	*1,94,000*
Chief Seaports.										
From—										
Madras Ports	15,24,631	6,820	...	42	233	418	66	4,486	...	15,36,696
Bombay	1,34,712	66,35,454	100	13,195	10,92,712	6,63,620	10,20,102	8,23,262	...	1,03,83,157
Karachi	...	...	5,46,397	...	2,82,692	22,97,894	...	...	...	31,26,983
Calcutta	180	5,523	1,200	45,55,055	14,32,044	2,47,410	84,438	538	7,52,524	70,78,912
Total*	*16,59,523*	*66,47,797*	*5,47,697*	*45,68,292*	*28,07,681*	*32,09,342*	*11,04,006*	*8,28,286*	*7,52,524*	*2,21,25,748*
GRAND TOTAL*	*17,59,506*	*67,02,634*	*5,73,112*	*47,48,392*	*34,13,367*	*38,32,001*	*11,81,224*	*9,84,616*	*7,72,070*	*2,39,66,922*
TOTAL IRON AND STEEL†	*14,74,946*	*25,32,591*	*1,74,263*	*49,73,544*	*23,26,435*	*24,19,805*	*4,66,235*	*2,45,069*	*4,36,107*	*1,50,48,995*
GRAND TOTAL OF IRON AND STEEL.	32,34,452	92,35,225	7,47,375	97,21,936	57,39,802	62,51,806	16,47,459	12,29,685	12,08,177	3,90,15,917

* From 1st October 1896
† From 1st April to 30th

and STEEL—*TOTAL.*

India between 1st April 1896 and 31st March 1897.

INTO

Native States.				Chief Seaports.					Grand Total.	Total Iron and Steel.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.		
R	*R*	*R*	*R*	*R*	*R*	*R*	*R*	*R*	*R*	VALUE.
										British Provinces (EXCLUDING CHIEF SEAPORTS).
										From—
...	14,073	8,210	22,283	1,20,735	8,131	...	...	1,28,866	***1,62,159***	Madras.
34,057	48,997	47,000	1,30,054	3,305	1,65,284	...	...	1,68,589	***5,04,824***	Bombay.
...	...	...	...	...	...	36,898	...	36,898	***1,78,137***	Sind.
645	...	...	645	130	59	...*	8,08,734	8,08,923	***9,56,740***	Bengal.
54,384	24	37	54,445	728	4,861	666	27,638	33,893	***3,92,825***	North-West Provinces and Oudh.
25,914	...	...	25,914	72	2,761	4,370	1,233	8,436	***3,66,719***	Panjab.
17,072	94	...	17,166	15	13,907	...	71,803	85,725	***5,95,706***	Central Provinces.
775	11	...	786	...	10,807	...	...	10,807	***22,787***	Berar.
...	...	...	...	...	...	...	4,106	4,106	***4,813***	Assam.
1,32,847	*63,199*	*55,247*	*2,51,293*	*1,24,985*	*2,05,810*	*41,934*	*9,13,514*	*12,86,243*	***31,84,710***	Total.*
										Native States.
										From—
...	...	...	...	127	6,955	50	34,368	41,500	***1,78,035***	Rajputana and Central India.
...	...	...	...	2,367	4,866	...	...	7,233	***39,557***	Nizam's Territory.
...	...	...	...	46,717	66	...	...	46,783	***71,924***	Mysore.
...	...	...	...	*49,211*	*11,887*	*50*	*34,368*	*95,516*	***2,89,516***	Total.*
										Chief Seaports.
										From—
238	17,470	5,41,065	5,58,773	...	1,584	8	...	1,592	***20,97,061***	Madras Ports.
11,59,619	5,86,969	61,636	18,08,254	28,214	...	...	5,823	34,037	***1,22,25,448***	Bombay.
1,007	...	...	1,007	...	...	...	25	25	***31,28,015***	Karachi.
23,190	1,128	23	24,341	75	367	...	...	442	***71,03,695***	Calcutta.
11,84,084	*6,05,567*	*6,02,724*	*23,92,375*	*28,289*	*1,951*	*8*	*5,848*	*360,96*	***2,45,54,219***	Total.*
13,16,931	*6,68,766*	*6,57,971*	*26,43,668*	*2,02,485*	*2,19,648*	*41,992*	*9,53,730*	*14,17,855*	***2,80,28,445***	GRAND TOTAL.*
8,20,494	*4,21,704*	*6,66,290*	*19,08,488*	*1,18,242*	*62,026*	*13,875*	*7,36,052*	*9,30,195*	***1,78,87,678***	TOTAL OF IRON AND STEEL.
21,37,425	**10,90,470**	**13,24,261**	**45,52,156**	**3,20,727**	**2,81,674**	**55,867**	**16,89,782**	**23,48,050**	***4,59,16,123***	GRAND TOTAL OF IRON AND STEEL.

to 31st March 1897.
September 1896. No details available.

Weight of Petroleum (Kerosine) carried by Rail and River in

IMPORTED

PETROLEUM.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
QUANTITY.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From —										
Madras	...	12	...	159	...	...	...	...	...	171
Bombay	15,873	...	...	...	...	1	895	2,256	...	19,025
Sind	...	...	...	...	6	1,363	...	...	...	1,369
Bengal	24,460	...	...	...	397,898	94,335	88,116	...	114,868	719,677
North-West Provinces and Oudh.	...	8	...	13	...	4,027	1,114	...	...	5,162
Panjab	...	...	20	887	1,875	...	...	...	...	2,782
Central Provinces	...	5	...	747	18	...	...	6	...	776
Berar	...	13	...	...	...	...	961	...	...	974
Assam	...	...	...	435	...	...	...	...	...	435
Total	*40,333*	*38*	*20*	*2,241*	*399,797*	*99,726*	*91,086*	*2,262*	*114,868*	*750,371*
Native States.										
From—										
Rajputana and Central India.	...	14	...	...	41	1	574	...	...	630
Nizam's Territory	10	68	...	....	...	...	1	...	...	79
Mysore	2,133	5	...	...	...	...	...	...	...	2,138
Total	*2,143*	*87*	...	...	*41*	*1*	*575*	...	...	*2,847*
Chief Seaports.										
From—										
Madras Ports	171,835	...	...	...	...	...	...	...	...	171,835
Bombay	37,127	403,513	...	...	8,319	3,140	115,787	122,187	...	690,073
Karachi	...	...	22,970	...	5,995	161,219	...	...	...	190,184
Calcutta	...	...	...	1,445,716	5,083	1,204	1,730	...	190,419	1,644,152
Total	*208,962*	*403,513*	*22,970*	*1,445,716*	*19,397*	*165,563*	*117,517*	*122,187*	*190,419*	*2,696,244*
TOTAL IN MAUNDS	*251,438*	*403,638*	*22,990*	*1,447,957*	*419,235*	*265,290*	*209,178*	*124,449*	*305,287*	*3,449,462*
TOTAL IN GALLONS	2,011,504	3,229,104	183,920	11,583,656	3,353,880	2,122,320	1,673,424	995,592	2,442,296	27,595,696

PETROLEUM.

British India between 1st April 1896 and 31st March 1897.

INTO

Native States.				Chief Seaports.					Grand Total.		Petroleum.
Rajputana and Central India	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.			
Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Gallons.	Quantity.
											British Provinces (excluding Chief Seaports).
											From—
...	794	496	1,290	4,079	...	...	...	4,079	***5,540***	44,320	Madras.
907	2,080	36,178	39,165	...	385	...	...	385	***58,575***	468,600	Bombay.
...	...	...	...	...	...	2	...	2	***1,371***	10,968	Sind.
9,593	...	...	9,593	38	...	...	110	148	***729,418***	5,835,344	Bengal.
9,114	...	...	9,114	...	...	...	...	...	***14,276***	114,208	North-West Provinces and Oudh.
944	...	...	944	...	...	2	...	2	***3,728***	29,824	Panjab.
1,326	5	...	1,331	...	...	...	...	...	***2,107***	16,856	Central Provinces.
...	...	...	...	...	...	...	...	...	***974***	7,792	Berar.
...	...	...	...	...	...	...	...	...	***435***	3,480	Assam.
21,884	*2,879*	*36,674*	*61,437*	*4,117*	*385*	*4*	*110*	*4,616*	***816,424***	6,531,392	Total.
											Native States.
											From—
...	...	...	...	...	...	...	...	...	***630***	5,040	Rajputana and Central India.
...	...	...	...	20	...	...	...	20	***99***	792	Nizam's Territory.
...	...	...	...	1,020	...	...	...	1,020	***3,158***	25,264	Mysore.
...	...	...	...	*1,040*	...	...	...	*1,040*	***3,887***	31,096	Total.
											Chief Seaports.
											From—
...	27,953	44,616	72,569	...	...	...	...	...	***244,404***	1,955,232	Madras Ports.
132,074	36,661	29,004	197,739	2,671	...	...	...	2,671	***890,483***	7,123,864	Bombay.
...	...	...	...	...	...	...	...	...	***190,184***	1,521,472	Karachi.
345	...	...	345	...	...	...	...	...	***1,644,497***	13,155,976	Calcutta.
132,419	*64,614*	*73,620*	*270,653*	*2,671*	...	...	...	*2,671*	***2,969,568***	23,756,544	Total.
154,303	*67,493*	*110,294*	*332,090*	*7,828*	*385*	*4*	*110*	*8,327*	***3,789,879***	...	Total in Maunds.
1,234,424	539,944	882,352	2,656,720	62,624	3,080	32	880	66,616	...	30,319,032	Total in Gallons.

Value of Petroleum (Kerosine) carried by Rail and River in

IMPORTED

PETROLEUM.	BRITISH PROVINCES (EXCLUDING CHIEF SEAPORTS).									
	Madras.	Bombay.	Sind.	Bengal.	North-West Provinces and Oudh.	Panjab.	Central Provinces.	Berar.	Assam.	Total.
	₹	₹	₹	₹	₹	₹	₹	₹	₹	₹
VALUE.										
British Provinces (EXCLUDING CHIEF SEAPORTS).										
From—										
Madras . . .	...	77	...	1,024	...	...	...	...	...	1,101
Bombay . . .	71,428	...	...	...	...	5	4,028	10,152	...	85,613
Sind	...	...	...	...	26	5,963	...	...	...	5,989
Bengal . . .	1,03,955	...	...	...	16,91,066	4,00,924	3,74,493	...	4,88,189	30,58,627
North-West Provinces and Oudh.	...	48	...	78	...	24,162	6,684	...	...	30,972
Panjab . . .	...	...	105	4,657	9,844	...	...	...	...	14,606
Central Provinces .	...	32	...	4,762	115	...	...	38	...	4,947
Berar . . .	...	65	...	...	...	...	4,805	...	..	4,870
Assam . . .	...	...	...	1,849	...	...	...	...	...	1,849
Total .	*1,75,383*	*222*	*105*	*12,370*	*17,01,051*	*4,31,054*	*3,90,010*	*10,190*	*4,88,189*	*32,08,574*
Native States.										
From—										
Rajputana and Central India.	...	63	...	...	246	5	3,659	...	...	3,973
Nizam's Territory .	64	306	...	...	...	...	6	...	...	376
Mysore . . .	13,731	23	...	...	...	...	...	...	...	13,754
Total .	*13,795*	*392*	...	...	*246*	*5*	*3,665*	...	...	*18,103*
Chief Seaports.										
From—										
Madras Ports . .	11,06,188	...	...	...	...	...	...	...	...	11,06,188
Bombay . . .	1,67,072	18,15,809	...	...	37,436	14,130	5,21,041	5,49,841	...	31,05,329
Karachi . . .	...	...	1,00,494	...	26,228	7,05,333	...	...	...	8,32,055
Calcutta . . .	...	...	...	61,44,293	21,603	5,117	7,352	...	8,09,281	69,87,646
Total .	*12,73,260*	*18,15,809*	*1,00,494*	*61,44,293*	*85,267*	*7,24,580*	*5,28,393*	*5,49,841*	*8,09,281*	*1,20,31,218*
TOTAL VALUE .	14,62,438	18,16,423	1,00,599	61,56,663	17,86,564	11,55,639	9,22,068	5,60,031	12,97,470	1,52,57,895

PETROLEUM.

British India between 1st April 1896 and 31st March 1897.

INTO

Native States.				Chief Seaports.					Grand Total.	Petroleum.
Rajputana and Central India.	Nizam's Territory.	Mysore.	Total.	Madras Ports.	Bombay.	Karachi.	Calcutta.	Total.		
R	R	R	R	R	R	R	R	R	R	
										VALUE.
										British Provinces (EXCLUDING CHIEF SEAPORTS).
										From—
...	5,011	3,193	8,304	26,259	...	...	...	26,259	***35,664***	Madras.
4,081	9,360	1,62,801	1,76,242	...	1,733	...	...	1,733	***2,63,588***	Bombay.
...	...	...	...	...	...	9	...	9	***5,998***	Sind.
40,770	...	...	40,770	161	...	...	467	628	***31,00,025***	Bengal.
54,684	...	...	54,684	...	...	...	...	...	***85,656***	North-West Provinces and Oudh.
4,956	...	...	4,956	...	...	10	...	10	***19,572***	Panjab.
8,453	32	...	8,485	...	...	...	...	...	***13,432***	Central Provinces.
...	...	...	...	...	...	...	...	...	***4,870***	Berar.
...	...	...	...	...	...	...	...	...	***1,849***	Assam.
1,12,944	*14,503*	*1,65,994*	*2,93,441*	*26,420*	*1,733*	*19*	*467*	*28,639*	***35,30,654***	Total.
										Native States.
										From—
...	...	...	...	...	...	...	...	...	***3,973***	Rajputana and Central India.
...	...	...	...	129	...	...	...	129	***505***	Nizam's Territory.
...	...	...	...	6,566	...	...	...	6,566	***20,320***	Mysore.
...	...	...	...	*6,695*	..	...	...	*6,695*	***24,798***	Total.
										Chief Seaports.
										From—
...	1,79,947	2,87,215	4,67,162	...	...	...	...	...	***15,73,350***	Madras Ports.
5,94,333	1,64,975	1,30,518	8,89,826	12,019	...	...	...	12,019	***40,07,174***	Bombay.
...	...	...	...	...	...	...	...	...	***8,32,055***	Karachi.
1,466	...	...	1,466	...	...	...	...	...	***69,89,112***	Calcutta.
5,95,799	*3,44,922*	*4,17,733*	*13,58,454*	*12,019*	...	...	...	*12,019*	***1,34,01,691***	Total.
7,08,743	**3,59,425**	**5,83,727**	**16,51,895**	**45,13**	**1,733**	**19**	**467**	**47,353**	***1,69,57,143***	TOTAL VALUE.

Statement of Mineral grants and licenses made during the year 1897.

Statement of Mineral grants and licenses made during the year 1897.

Province.	District.	Grantee.	Minerals.	Nature of grant.	Area.	Date of commencement.	Term.
1	2	3	4	5	6	7	8
					Acres.		Years.
MADRAS.	Nellore . .	Messrs. Best, & Co. .	Mica . .	Mining .	34·20	17th July 1897 .	5
		M. Picchi Reddi . .	Do. . .	Do. .	25·00 12·00	13th October 1897.	3
		P. Vankata Reddi . .	Do. . .	Do. .	10·00	11th September 1897.	3
		P. Rama Krishnamma Nayudu.	Do. . .	Do. .	13·00	30th August 1897.	10
		K. Ramachandryya .	Do. . .	Do. .	7·02	31st August 1897.	20
		B. Venkata-subba Reddi .	Do. . .	Prospecting .	12·37	12th Novembe 1897.	1
		A. Subba Nayudu . .	Do. . .	Mining .	11·03	20th August 1897.	10
		K. Muniswami Aiyar on behalf of K. Ramaswami Aiyar and brothers, Madras.	Do. . .	Do. .	16·00	15th October 1897.	3
		D. Narasa Reddi . .	Do. . .	Do. .	3·75	15th September 1897.	5
		Ditto . .	Do. . .	Do. .	6·44	1897.	5
		Messrs. Best, & Co. .	Do. . .	Do. .	11·84	25th August 1897.	5
		D. Narasa Reddi . .	Do. . .	Do. .	20·65	29th October 1897.	15
		Ditto . .	Do. . .	Do. .	17·50	29th October 1897.	15
		M. Picchi Reddi . .	Do. . .	Do. .	5·00	26th October 1897.	10
		B. Adinarayana Reddi .	Do. . .	Do. .	4·45	28th October 1897.	5
		D. Narasa Reddi . .	Do. . .	Do. .	3·15	29th October 1897.	15
		I. Subbarami Reddi .	Do. . .	Do. .	24·79	12th October 1897.	5
		P. Venkata Reddi . .	Do. . .	Do. .	11·57	15th October 1897.	10
		Mirza Mehdi Isphani and Sons.	Do. . .	Do. .	10·70	12th November 1897.	5
		B. Venkata Subba Reddi .	Do. . .	Do. .	7·88	12th November 1897.	6
		Hazrath Movalani Muhammad Assuddin Sahib Khaji.	Do. . .	Do. .	5·58	13th November 1897.	11
		Raghavulu Nayudu .	Do. . .	Do. .	8·61	19th November 1897.	10
		B. Venkata Subba Reddi .	Do. . .	Do. .	4·76	12th November 1897.	6
		Haji Muhammad, Badsha Sahib, and Co.	Do. . .	Do. .	33·76	29th November 1897.	5
		Hazrath Movalani Muhammad Assuddin Sahib Khaji.	Do. . .	Do. .	3·00	13th November 1897.	11

NOTE.—The extent entered in column 6 represents the actual extent made over to the applicants after deduction for roads and cart tracts closed by.

Statement of Mineral grants and licenses made during the ,

Province.	District.	Grantee.	Minerals.	Nature of grant.	Area.	On commencement.	
1	2	3	4	5	6	7	8
					Acres.		Years.
Madras.	Neliore .	K. Abdul Karim Sahib	Mica . .	Mining .	6·00	4th December 1897.	10
		P. Venkata Reddi . .	Do. . .	Do. .	10·00	5th January 1898	5
		A. Subba Nayudu . .	Do. . .	Do. .	20·99	9th December 1897.	30
		Ditto . .	Do. . .	Do. .	52·96	9th December 1897.	30
		D. Narasa Reddi . .	Do. . .	Do. .	14·61	22nd December 1897.	5
		A. Subba Nayudu . .	Do. . .	Do. .	52·85	18th March 1898	30
		Y. Krishna Reddi . .	Do. . .	Do. .	5·00	13th January 1898.	5
		Mahammad Kurban Hossein, Sahib.	Do. . .	Do. .	3·00	20th December 1897.	
		Hazrath Movalani Muhammad Assuddin Sahib, Khaji.	Do. .	Do. .	6·40	3rd January 1898	11
	Coimbatore .	Mr. W. T. Hamilton Holmes.	Gold . .	Prospecting .	320·00	3rd February 1897.	1
	Kurnool . .	Messrs. W. J. Eales & Co. of Madras.	Steatite .	Do. .	100·00	18th November 1897.	1
	Salem . .	Mr. H. G. Turner . .	Magnesite and Chrome iron.	Do. .	188·20	30th November 1897.	1
Bombay.	Dharwar Taluka Alnavar and Kudalgeri.	Haji Ismail Wd. Haji Mahomed Kulli Mirza Bagdadi.	Gold . .	Mining .	144·32 15·8	1st August 1897	30
	Hubli Taluka Ajjapur and Budarsingi.	Mr. Ibrahim Bhai Ismail Khan Pathan, 1st Assistant Deputy Educational Inspector, Dharwar.	Precious stones	Prospecting .	120·30	15th September 1897.	1
	Palanpur .	Cursetji Manaékji and Company.	Granite-like stone.	Mining .	.....	.....	15
Punjab Bengal.	Singhbhum .	Mr. E. G. Barton . .	Gold, silver and other Minerals.	Exploring .	12 miles long and 3 miles wide.	19th September 1897.	1
	Kangra (Waziri Rupi tract).	Mr. Peter Hutchison of Glasgow.	Do.	Prospecting .	About 677 square miles.	14th January 1898.	2
Burma.	Kyaukpyu .	R. S. Dunlop and W. McCarren.	Petroleum	Do. .	292·50	29th September 1897.	1
	Pakôkku .	Hlethin Atwinwun . .	Do.	Mining .	640	1st July 1897 .	30
		Messrs. Mower, Fuller, Winter and Moore.	Do. .	Do. .	1,280	1st July 1897 .	30
	Minbu . .	Burma Oil Company .	Do. .	Prospecting .	3,814·4	1st August 1897	1
	Bhamo . .	Maung On Bwin . .	Gold . .	Exploring .	192,640	1st December 1897.	1
	Katha . .	Ko Chee . . .	Do. . .	Prospecting .	160	1st April 1897 .	1
		A. E. Thompson . .	Do. . .	Do. .	160	16th June 1897 .	1
		Ditto . .	Do. . .	Do. .	640 (or thereabouts)	1st August 1897	1
		A. G. Blackwell . .	Do. . .	Mining .	160	1st September 1897.	30

...al grants and licenses made during the year 1897—concld.

1	2	3	4	5	6	7	8
	...	Grantee.	Minerals.	Nature of grant.	Area.	Date of commencement.	Term.
					Acres.		Years.
Burma.	Myingyan .	Burma Oil Company .	Petroleum .	Prospecting .	1,920	1st September 1897.	1
Burma.	Southern Shan States.	Maung Kya Ywet, Ngwegunhmu of Bawzaing State.	Lead . .	Mining .	$2\frac{1}{16}$	1st September 1897.	5
Central Provinces.	Bilaspur . .	Messrs. Turner, Morrison & Co., Calcutta.	Mica . .	Exploring .	774 square miles in the Pendra zemindari.	3rd May 1897	1
Assam.	Naga Hills .	Mr. C. E. Pickford, Voabari Tea Estate, Sibsagar.	Coal . .	Prospecting .	4 square miles	1st December 1897.	1
Assam.	Ditto .	Ditto . . .	Do. . .	Exploring .	1,200 square miles.	Ditto .	1

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